TRANSACTIONS AND PROCEEDINGS

AND

REPORT

OF THE

ROYAL SOCIETY of SOUTH AUSTRALIA

(INCORPORATED).

VOL. XXXI.

[WITH TWENTY-NINE PLATES AND SEVENTY-EIGHT FIGURES IN THE TEXT.]

EDITED BY WALTER HOWCHIN, F.G.S.

PRICE, SEVEN SHILLINGS AND SIXPENCE.

Adelaide:
W. C. RIGBY, 74, KING WILLIAM STREET.
DECEMBER, 1907.

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Appendices.

Anthropological Notes on the Western Coastal Tribes of the Northern Territory of South Australia.

By Herbert Basedow.

[Read October 2, 1906.]

Plates I. to XIX.

The following facts, relative to the characteristics and customs of several native tribes of the Northern Territory, I gathered while acting as Assistant to the Government Geologist, Mr. H. Y. L. Brown, on geological explorations during 1905. The accompanying figures are reproductions of my original field-sketches.

The tribal distribution, and, simultaneously, the extent of tribal territory, of the native population of the north-western coastal districts of the Northern Territory vary directly as the natural resources of the particular locality.

Corrigendum.

By request of the author (who is absent from Australia) delete, on page 23, line 30, and on page 25, line 31, *Ceratodus*, as one of the fishes obtained by the natives in the rivers of the Northern Territory.—Ed.

mouth of the Blackmore River and forming the southern boundary at about twenty-five miles inland. The *Larrekiya* further separate themselves into coastal and inland groups, the former being called the *Binnimiginda*, the latter the *Gunmajerrumba*.

* This is how the pronunciation appears to me. I am aware that other authors have alluded to the tribe, and adopted slight variations in their spelling. *Vide* Foelsche: Trans. Roy. Soc., S.A., vol. v., 1882 *(Larrakeah)*; Coppinger: Voyage of the "Alert," 1883 *(Larikia)*; Curr: The Australian Race, 1886, vol. i. *(Larrakia* and *Larragea)*; Mackillop: Trans. Roy. Soc., S.A., vol. xvii., 1893 *(Larrikiya)*; Parkhouse: Trans. Roy. Soc., S.A., vol. xix., part 1, 1895, and Austr. Assoc. Adv. Science, vol. vi., 1895 *(Lárraki'a, Larrakiha, Larrikia, Larrakeeha, and Larreekeeyah)*.

They are joined on the west by a coastal tribe, the *Wogait*,* who claim country across the Daly River to about Cape Ford, and on the east by the *Wulna*† tribe. Between the *Wogait* and *Larrekiya*, and passing south of the former to the Daly River mouth, lies the country of a small tribe, the *Sherait*, or "Paperbark natives," closely related to the *Larrekiya*. East of the *Sherait* border the *Gunerakan*. The *Ponga-ponga* tribe lives to the south of the *Wogait*, on the Daly River; and still further south the *Mulluk-Mulluk*,‡ a powerful tribe, holds a large area, which is subdivided and allotted to individual dependent clans, as the *Djiramö*, on the west bank of the river, south-west of Mount Litchfield, and the *Komorrkir*, living on the same bank, south of the *Djiramö*. With a more local distribution, the *Marranunga*, another strong tribe, occupies the country around Hermit Hill.

The *Wogaits* are bordered on the west by the *Berringin*, whose domain extends from Cape Ford to a point about 18½ miles north of Point Pearce, known to them as *Allaitperra*. They are bordered on the south by either a distinct tribe or subdivision of their own, known as the *Kujera*, who were not seen personally. The *Ginmu* are the next on the west, extending, roughly, to the boundary of Western Australia.

Southwards from Port Darwin, along the mining centres, the original tribes have been disarranged by European and Asiatic interference, and it is difficult to secure authentic information concerning their former possessions and rites. One large tribe, called the *Awarrai*,§ has existed south of the *Larrekiya*, extending from Mounts Charles and Gun south to about the latitude of Mount Wells. To the south-east, beyond the Mary River, are the *Agiwallem*, the valley in which Burrundie now stands forming neutral ground.

The tribes east of the Adelaide River were not visited; but through the kindness of Mr. F. E. Benda, Secretary to the Hon. Minister controlling the Northern Territory, I have received the names of tribes of the MacArthur River district, which were collected by the late Cornelius Power, Corporal of Police, stationed at Borroloola. The majority of these names, allowing for slight phonetic variations, have

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* Various synonyms for this tribe exist, such as *Waggait*, *Waggite*, *Worgite*, and *Waggote*.

† Sometimes written *Woolner*.

‡ Knut Dahl spells this name *Mollak Mollak*: Trans. Roy. Soc., S.A., vol. xix., 1895, p. 122.

§ *Awárra* of Parkhouse: Trans. Roy. Soc., S.A., vol. xix., 1895; and Austr. Assoc. Adv. Science, vol. vi., 1895.

already been published by Messrs. Spencer and Gillen,* but I, nevertheless, reproduce them here, in confirmation of the statements of these writers. In this list I adhere to the original spelling by Power, which is according to the English pronunciation; while the names in parentheses, immediately following, are those given by Spencer and Gillen in the system of orthography established by the Royal Geographical Society of London.

The *Anyoola* tribe *(Anula)* inhabits the McArthur River district, from about Borroloola to the coast, as well as the Pellew Islands at the river mouth.

The *Korrawa (Karawa)* is a very large tribe, living about the watersheds of the Robinson and Calvert Rivers.

The *Binbinga (Binbinga)*, a peaceful tribe, occupies the McArthur River district for forty miles south of Borroloola.

The *Godangee* (probably a branch of the *Gnanji)*, adjoins the *Binbinga* on the east.

The *Yumpia (Umbaia)* lives in country extending south of the *Binbinga*, to the tablelands. Both this tribe and the former are noted for cattle-killing.

The *Alowa (Allaua)* territory lies west of the *Binbinga*, in the Limmen River district.

The *Marra (Mara)* is a large tribe, occupying the Limmen River, north of the *Allaua*, to the coast, and west of the *Anula*.

The *Willongera (Wilingura)* is a small and peaceable tribe, to the south of the *Mara*.

The *Angee* and *Anga* (no doubt branches of the *Nganji)* are small, hostile tribes, living south and west of the *Allaua*, at the head of the Wickham River.

The *Chingalee*† *(Tjingilli)* holds territory to the west, and the *Laytha* to the south, of the *Umbaia*.

The *Goonanderry* is distributed along the Robinson and Calvert Rivers, south of the *Karawa*: and, lastly, the *Wanee* tribe borders the *Goonanderry*, on the south, and extends to the head of the Nicholson River.

Although the dialects of the *Larrekiya*, *Wogait*, and *Sherait* are distinct, it is usual for members of any one tribe to be familiar with the languages of the other two, the *Wogaits*, in addition, having a fair knowledge of that of the *Berringin*. The *Mulluk-Mulluk* dialect is that most generally understood among the various tribes grouped near the

* The Northern Tribes of Central Australia. London, 1904.

† See also A. G. B. Ravenscroft: Trans. Roy. Soc., S.A., vol. xv., 1892, p. 121.

territory of the latter. Short comparative vocabularies of four tribes are appended.

The *Larrekiya* and *Wogait* are, so far as my observation went,* friendly with one another, and tribal intermarriage is not infrequent.

Amongst the *Larrekiya*, given that a man marries the daughter of his mother's sister—the husband of this (his aunt) is *unnya* to him, she being *ngalling* to him, and *halledik* to his *unnya*. The daughter of his *ngalling* then becomes his *halledik*, and he is *ngau* to her. If by the union of *unnya* and *halledik* the offspring is a female, she is *ullmürruk* to the former and *ngalle* to the latter. This *ullmürruk* becomes the property of the corresponding male offspring of his sister, and is to him *nugganyi; ullmürruk* of *unnya* thereby becoming *halledik* of *unnya's nugganyi*. The female offspring of this union is *allitmit* to *unnya*, and may be given to the corresponding offspring of the male child of the *nugganyi's* sister.†

According to the legends of the *Larrekiya* it happened many years ago that a baby boy rose suddenly from the ground out of the burrow of a bandicoot (*Perameles* sp.). He was seen by the people of the *Larrekiya*, who invited him to come to their camp, but he refused. Some time after, when he had become a man, they again met him. Again he was asked to join the *Larrekiya* men in camp, but once more he declined. Thereupon the men became angry, and dragged him to a waterhole, and threw him into it. The stranger immediately sank, and five bubbles of air arose to the surface as he disappeared. The men sat down and watched the water, when suddenly the face of the man reappeared. The *Larrekiya* hurled a spear at him, and he was killed, because he had no father and no mother, but was an accomplice of the evil spirit, who, it is asserted by the old men of the *Wogait*, makes a big fire, from which he takes an infant and places it at night in the womb of a lubra, who must then give birth to the child.

In the ordinary course of events, if a man, when out hunting, kills an animal or collects any other article of diet, he gives it to his gin, who must eat it, believing that the respective object brings about the successful birth of a piccaniny.

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* *Cf.*, " . . . the *Waggait*, whom both the *Lárraki'a* and *Awárra* detest . . ." T. A. Parkhouse: Austr. Assoc. Adv. Science, vol. vi, 1895, p. 638.

† Parkhouse explains this apparent marriage within the blood-tie, by stating that the relationship is not so close, the line of descent only and not the number of degrees being indicated: Austr. Assoc. Adv. Science, vol. vi., 1895, p. 641.

In other words, conception is not regarded as a direct result of cohabitation. The child, on no account, must partake of the particular food until it has successfully teethed.

At childbirth the navel cord is twisted off. What may be the consequence of this treatment is the fact that abnormal swellings were frequently seen in the region of the navel in grown-up individuals.

During the menses of a woman the man must not receive any food from her, or she from him; otherwise it is believed that a serious illness will result on either side, which no medicine-man could alleviate. If, however, by accident or misunderstanding, food has passed from man to woman, or *vice versa*, the medicine-man may be summoned, who removes the pain by gestures and by pretending to remove an offending body by sucking, eventually shewing a piece of meat covered with blood to the sufferer.

If a medicine-man has a bad case of sickness to deal with, he pulls out a few hairs from his armpit, burns them, and places the ashes in the nostrils of the patient, over which he holds his hands in the shape of a funnel and blows thereon.

When a dugong has been captured by the men, all women are kept at a distance, and not allowed to witness the cutting-up of the spoil; but they may subsequently take part in the feast. If they were present all the flesh would pass from their bodies, and they would become barren.

The aborigines make the statement that when they kill a dugong (which is said to be often done by forcing small rods into its nostrils) it wails and whines pitifully like a human being. The female animal, further, is said to carry her young on her fin like a lubra carries her infant,* and, swimming with the other fin, suckles it. When tired, she changes about from one fin to the other.

According to their traditions, long ago a blackfellow ate a certain berry, when some of the juice squirted into his eyes. The pain was intolerable, and he became blind. In his agony he tossed himself about until he fell, and began to roll down the hill-slope on which he had been sitting. His body continued rolling over and over until he reached the cliffs on the coast, and fell into the sea. The rolling motion continued until he was gradually converted into the form of a dugong.

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* *Cf.* Keppel's remark on the motherly affection of the female dugong: A Visit to the Indian Archipelago, 1853, vol. ii., p. 179.

Funeral Ceremonies.

When a man dies, the corpse is kept for a day, and painted over with ochre. The fat of the deceased is rubbed over the bodies of the mourners, the gins included. In former days the general custom, now only retained by the furthest-out tribes, was to construct a platform of boughs and bark in the forks of trees, upon which the body was left until all the soft parts had been removed by birds of prey.* See pls. v. and vi. A bone† (radius) of the left arm of the deceased is then taken, tied to a necklace, and worn round the neck of a relative, who thereby is supposed to acquire the strength and qualities of the deceased. The remaining bones of the skeleton are wrapped up in paper-bark (*Melaleuca leucodendron*) and buried.

The bodies of old men and old gins are buried in the ground without having been previously placed in a tree.

The interment is carried out by four men, who stand above the grave (which is about 5 feet deep), and hand the corpse to two men down below. The latter place it in a recumbent posture on its right side, with the legs tucked upwards, and the head resting upon the hands. The female mourners gash their scalps with the points of yam-sticks, and scar the backs of one another. See pls. iii. and vii. The men cut their upper arms and thighs transversely with stone knives, or gash their foreheads with the sharp edges of their spear-throwers. Both parties cover their bodies and hair with pipeclay and ashes. Songs of wailing are sung by both males and females, those of the women resembling the sounds expressed by:—

Nge e n'
Hö hö un un.

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* *Cf.* J. L. Stokes: Discoveries in Australia, 1846, vol. ii., p. 295, *et seq.*, and plate; E. J. Eyre: Journs. Expeditions of Discovery into Central Australia, 1845, vol. ii., p. 345, and plate; H. Keppel: A Visit to the Indian Archipelago, 1853, vol. ii., p. 181, and plate; J. D. Woods: Trans. Phil. Soc., S.A., 1879, p. 84; P. Foelsche: Trans. Roy. Soc., S.A., vol. v., 1882, p. 5; Curr: The Australian Race, 1886, vol. i., pp. 255 and 272; W. G. Stretton: Trans. Roy. Soc., S.A., vol. xvii., 1893, p. 237; T. A. Parkhouse: Austr. Assoc. Adv. Science, vol. vi., 1895, p. 643; W. E. Roth: Ethnological Studies among the N.W. Central Queensland Aborigines, Brisbane, 1897, p. 165, pl. xxiii., fig. 406; T. Worsnop: The Prehistoric Arts, Manufactures, Works, Weapons, etc., Adelaide, 1892, p. 66, pl. xxxiv.

† *Cf.* Spencer and Gillen: The Northern Tribes of Central Australia, 1904, cap. xvii. The Port Essington natives are said to have carried all the bones about with them in baskets. Foelsche: Trans. Roy. Soc., S.A., vol. v., 1882, p. 6.

The response on part of the men is equivalent to long-drawn:

He e ö, He e ö, He-e ö;

the *n'* and *un*, above, and the *ö*, below, sounding like sobs. Seeds of the *Cycas media** are collected, and stored in water for three days, when the mourners congregate and feast upon them.

After the body has been interred a sign-post is erected at some distance from the mound upon which the spear-thrower of the deceased is stuck into the ground. It consists of an upright pole,† to the top of which a bundle of grass is fixed; just beneath it is fastened a cross-piece, projecting to unequal lengths on either side, round each end of which is wrapped a bundle of grass; the whole resembling in appearance a scarecrow with outstretched arms. The longer of these horizontal arms has inserted into it a rod which points directly to the site of the grave. Suspended from the end of the opposite arm are feathers or paper-bark, in such a way that they swing in the wind, and so serve to attract the attention of passers-by, who can recognize the spot, and pay their respects to the departed. In the meantime the main camp has removed from the locality.

During the mourning ceremony the spears of the deceased are placed across a frame, consisting of two branches of trees resting in the forks of two pairs of upright stems driven in the ground.

In the *Mulluk-Mulluk*, when a man dies outside his tribal country he is buried immediately. A circular space is cleared for a radius of about eight feet, in the centre of which the deceased is interred. Over this a mound of earth is made, which is covered with sheets of paper-bark, kept in place by three or four flexible wands stuck into the ground at their ends, and passing over the mound transversely to its length. Stones are laid along the border of the grave, and one or two upon the mound. See fig. 1.

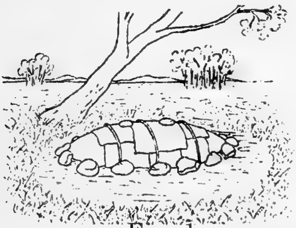

Fig. 1.

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* Foelsche mentions the eating of yams during the mourning ceremony of children: Trans. Roy. Soc., S.A., vol. v., 1882, p. 5.

† Similar, no doubt, to the painted pole described by Foelsche: Trans. Roy. Soc., S.A., vol. v., 1882, p. 5.

The corpses of well-nourished children up to the age of two or three years were primarily disposed of by eating them,* but this custom is not at the present day strictly adhered to by the semi-civilized peoples.

Every native believes in his re-incarnation after death in the form of some living being which is always held in respect † by him. This belief, however, did not appear to be general amongst the *Larrekiyas* that were questioned.

Personal Mutilations.

Female infants are subjected to mutilation by removal of two joints of the right forefinger.‡ In the western tribes, *Ginmu*, the finger is cut off with a stone knife. Elsewhere it is amputated at a later age by binding tightly round the joint a ligature made of cobwebs of a spider that lives in the mangroves, the limb withering away gradually. It appears, also, that in certain instances the joints are removed by biting, and in the *Wogait* the amputated segment is buried in an anthill. The operation takes place without ceremony, and does not seem to be strictly adhered to by the latter tribe A singular case came under notice in the *Ginmu* tribe, where a young girl had had the two joints of her finger imperfectly removed, and upon the mutilated stump a horny growth, which resembled a diminutive finger-nail, had grown.

When a child of either sex has reached the age of about six years its nasal septum is perforated. The operation is performed by an old man, who seizes the septum with thumb and forefinger, draws it forward, and pinches a hole through it with the nails. Through the perforation a small, sharpened bone of a kangaroo is inserted, and the hole made larger by gradually expanding it with a peg. During the operation another man holds his hands firmly over the ears of the child, which is thus not supposed to perceive the pain. When the hole is large enough, a single small smooth segment of bamboo is inserted by passing it over the kangaroo bone. The child must sleep upon its back until the wound has healed. The bamboo is replaced from time to time by a larger one, and if, by chance, the rod should become fixed by clotting of blood or otherwise, a strong blade of grass is inserted between the

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* *Cf.* Foelsche: Trans. Roy. Soc., S.A., vol. v., 1882, p. 5.

† *Cf.* Parkhouse: Austr. Assoc. Adv. Science, vol. vi., 1895, p. 640, second paragraph.

‡ *Cf.* Foelsche: Trans. Roy. Soc., S.A., vol. v., 1882, p. 7; Mackillop: Trans. Roy. Soc., S.A., vol. xvii., 1893, p. 257. Dr. W. E. Roth informs me that the practice of mutilating the little finger is still in vogue in Queensland, and in early days was prevalent down the coastline, certainly as far south as Sydney.

rod and edge of the hole, and, being held by either end, drawn round the rod circumferentially to scrape or saw through the adherent parts. The operation takes place without any particular ceremony, and men and women, alike, may be present. The nose-stick is not usually worn except during corrobborees, and when neighbouring tribes are visited.* See pl. ii.

Bamboo nose-stick: *Lar.*, Damörrenelle; *Wog.*, Widjadöl; *Sher.*, Yinnung delluk.

Wooden nose-rod: *Lar.*, Mamalölma; *Wog.*, Barrong nget.

Body Scars.

As a very general rule, the raised cicatrices are less pronounced than in Central Australia, and are, except in certain cases, developed to a less extent in the coastal than the inland tribes. In the *Larrekiya* low cicatrices are favoured; abnormally-developed scars being associated with an early death. Among the *Larrekiya* and *Wogait* it was noted that the chest incisions, particularly in the case of the younger generation, were not treated, as is generally the custom, by the application of ashes into the wound.

The scarring of a *Wogait* boy is for the purpose of preparing him for the rite of initiation. If he can endure the cutting or scarring of his chest with fortitude, and without showing signs of pain, he is ready for the ceremony of circumcision.

In the *Ginmu* tribe the scarring *(ngeri)* of a boy is done at an early age by degrees, commencing on the upper arm, and ending on the chest, with the same object in view as amongst the *Wogaits*, viz., to make him hardy before circumcision. Among members of this tribe were noted one initiated youth with upper-arm scars and two chest incisions, another with four of the latter, a man with two chest and ten abdominal scars (the latter being interrupted centrally), a warrior with twenty-five abdominal and chest scars, and red-ochred bands across either shoulder. A girl about eight or nine years of age was cicatricised in the manner shown in fig. 2. The asymmetrical character of the abdominal scars is possibly related to the age and sex of the child. Two joints of her right index finger had been removed.

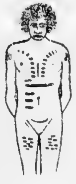

Fig. 2.

* Stokes mentions that the Port Darwin blacks "had a piece of bamboo, eighteen inches long, run through the cartilage of the nose." Discoveries in Australia, vol. ii., p. 19.

Another form of self-mutilation which men or women may inflict upon themselves at any time is produced by the application of the heated end of a fire-stick four or five times to the upper arm, and diagonally down the middle of the chest from either side. See pl. ii. This also gives rise to elevated scars.

First Initiation Ceremony of the Larrekiya Youth—The Böllier.

When the *Larrekiya* boy is to be initiated, his body is decorated with bands of white that are made by sticking on to him vegetable down from the seed-pods of a large tree, locally called the silk-cotton tree *(Bombatt malabatrica)*, and feathers. A horseshoe-shaped band is thus formed, passing from ear to ear, down the cheeks, and below the chin; the upper ends of this figure being connected by a horizontal band passing across the nose below the eyes. A similar band extends in front from shoulder to shoulder, above the nipples, and from this, two bands pass downwards over the abdomen and thigh to the knee, where each unites with a circle round the joint. From both shoulders a white line is drawn along the upper arm to the plaited arm-girdles at the elbow; additional bracelets being worn at the wrists.

Round his forehead is tied a band, known as *galambaua*, made of numerous twisted strands of opossum-fur, woven closely together, and coated with pipeclay. See pl. ii. The ends of the strings of this band are tied together at the back of the head by means of human-hair twine. Underneath the *galambaua*, at the centre of the forehead, is inserted a plume of feathers of the Nankeen night-heron *(Nycticorax caledonicus)* or emu, attached to an ironwood stick, the plume being downwards, while from either side of the head a fur-tassel *(Gwiyärum gaulüpmagga)* is hung by string. Identical appendages are fastened to the armlets. A necklace made of segments of grass stems threaded together *(mangulma)* is worn, and a broad belt *(danbidjulu)* of stringybark *(Eucalyptus* sp.), which, by virtue of its coiled form, can be adjusted to a waist of any size. The latter is made secure by tying the outer overlapping end with fur string, which is then wound continuously and spirally round the belt for its whole length and back again, thus producing a lattice-like effect. See pl. ii. The usual human-hair belt *(berelgma)* is tied over this, and from it the pubic tassel *(doi-ira)* is hung.

The boys—several pass through the ordeal at the same time—are separated, and made to sit in a row before the old men, holding their eyes shut with their right hand. The warriors, with the variety of spear afterwards to be described as *malligirrima* poised, stamp their feet in front of the boys uttering harsh cries of *árr-re! árr-re!* and *göra!* On the conclusion of this performance the boys, upon a given signal, look at the men. This finishes the first part of the ceremony.

For the next few months the boys, who are now styled *Böllier*, are kept away from the women and camp. They are led away into the bush by the men, whom they must assist by gathering food, and in other ways. At intervals they are submitted to severe blows between the shoulders by the old men in charge, and given to understand that they must, on peril of death, preserve strict silence as to all that has passed. Upon his return to camp, the *Böllier* usually has additional cicatrices inflicted upon his upper arm and thigh.

The *Larrekiya* does not circumcise, though they say that in early days the rite was practised until, at one ceremony, a subject died from the effects. Their belief is, now, that if anyone of the *Larrekiya* were to be circumcised he would die.* The Melville Island natives, also, do not circumcise.†

THE INITIATION CEREMONY OF THE WOGAIT YOUTH.

At the initiation of a *Wogait*, after his fortitude has been tested by scarring the chest, he is thrown on his back over the legs of four men, who sit close together two and two, facing one another, with their legs alternately spaced, so that the toes of one are next to the buttock of the man opposite; the legs of the four men forming, collectively, a continuous platform.‡ This stage is shown in fig. 3. A fifth man then sits upon the victim's chest, facing the operator; while another holds his head. The boy is gagged with a bundle of fur, which further serves the purpose of allowing him to bite upon it during his pain; his ears are stuffed, and his hands kept at his sides. The operator, smeared all over with pipe-clay, approaches from behind, and, kneeling upon the boy's thighs, draws the prepuce well forward, and cuts it off with a quartz flake. The wound is

Fig. 3.

* *Cf.*, "A reason was given for the custom falling into desuetude that the skin became too tender." Parkhouse: Austr. Assoc. Adv. Science, vol. vi., 1895, p. 643.

† *Vide* Foelsche: Trans. Roy. Soc., S.A., vol. v., 1882, p. 17.

‡ "In the ceremony of the *Aggrakundi*, a tribe south of the *Awarrai*, eight men lay on the ground, their faces in their folded arms, head and feet alternating, the backs forming a platform. Upon the buttocks the boy was laid. . . ."—Parkhouse, *op. cit.*, p. 645.

covered with paper-bark and ashes,* and the sufferer, who usually faints during the operation, is led away to the bush for about three weeks. Upon his return to camp he shows the operated part first to his mother, and then to the girl who has been selected as his wife; these scar their heads with a pointed yam-stick. The excessive degree of excitement and fear apparently makes the lad practically unconscious to pain, and after the event he is usually quite oblivious to what has happened.

The detached prepuce *(garijet barre)* is held against the bellies of those who have been present at the operation, then placed in a small dilly-bag *(garad)*, and worn round the neck of the operator until the wound has healed, when it is thrown into the fire. The cutting-flake used for the operation is embedded at one end in the wax of wild bees, which is heated and moulded round a bamboo. Into the groove thus produced the stone is thrust, and firmly embedded by squeezing the wax with the hand.

Although the *Larrekiyas* do not circumcise, yet when a performance of this nature is about to take place amongst the *Wogaits*, invitations to be present are sent to the former tribe, and the members of the two hold a joint corrobboree.

The following are some of the chants of this joint corrobboree:—

1. Narraya injala, bannaya injala, bannaiyaka injala bana; injala bannaiyaka injala, bannaya injalö bana.
2. Narraya kaninba, larrambana kanimba, larranbarraya kaninba, larrambana kanimba.
3. Anna yan na na ranga bana na ya ni ba, en kara bana, kara gan dorne, di di di di.

The corresponding accompaniment that is blown into the wooden trumpet or *kanbi* of the *Wogaits*, sounds, in the first chant, like:—

Didnodiddö diduadu didnadiddö diduadu - - - - - - - - - - - - - - - - didnarib;

in the second:—

Didjuadeldo, didjuadeldo - - - - - - didjnadelrip;

and in the third:—

Tid ja ru du, tid ja ru du, tid ja ru du - - - -

None of the north-western coastal tribes cited practise the rite of sub-incision, but it is well known that the tribes border-

* *Cf.* Knut Dahl: Trans. Roy. Soc. S.A., vol. xix., 1895, p. 122.

ing the Gulf of Carpentaria,* such as the *Anula*, *Mara*, and *Binbinga*, do so† to the same extent as in the Central Australian tribes. The rite was not observed in the tribe at the mouth of the Victoria River.‡

THE INITIATION CEREMONY OF THE LARREKIYA GIRL.

Although the girls of the *Larrekiya* and *Wogaits* are given away to men at a very early age, no cohabitation must take place until after the "smoking ceremony" of the girl, which is known as *Männiugu* by the *Larrekiyas*, and *Nitkurrum* by the *Wogaits*.

When the menses have commenced she must undergo the following ceremony, which takes place at night-time, and at some distance from the main camp, though not necessarily out of sight of it. Men do not attend, but may witness the proceedings from the camp at a distance.

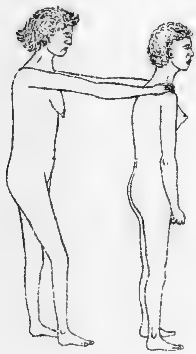

Fig. 4.

The girl, being decorated after the fashion of the *Böllier*, is seized from behind by an old gin (under whose care she has been), who places her hands upon the novice's shoulders. See fig. 4. Another woman places her hands upon the shoulders of the old gin in a similar manner, and the same thing repeated by the array of females taking part in the function, one standing behind the other

A chant, a long-drawn, continuous "*Ya, Ya, Ya*," is commenced; the old gin at this stage, stamping on the ground with her feet, moves forward and pushes the girl in front of her, while all the other women respond similarly, and follow in a line.

This chant suddenly ceases, and is replaced by another sounding like "*Yen da min*," the old gin stopping at this stage and imparting three smart blows upon the girl's back.

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* *Cf.* W. G. Stretton: Trans. Roy. Soc., S.A., vol. xvii., 1893, p. 232.

† *Cf.* Foelsche: Trans. Roy. Soc., S.A., vol. v., 1882, p. 17. Tribes inhabiting the western coast of the Gulf of Carpentaria, between the Roper and Nicholson Rivers, have a practice of slitting the penis along the urethra; Spencer and Gillen: The Northern Tribes of Central Australia, 1904, p. 133. From the Urabunna in the south, right through the centre of the continent to the western shores of the Gulf of Carpentaria, sub-incision is practised upon the young men.

‡ *Cf.* MacKillop: Trans. Roy. Soc., S.A., vol. xvii, 1893, p. 257.

The stamping motion, and the "*Ya, Ya, Ya,*" are commenced afresh, to be again changed to "*Yen da min*" and three blows on the girl's back. This procedure is kept up for the greater part of the night.

At the first glimpse of day the second item in the programme is started; it consists of the washing of the girl in the sea.* She is led to the water, and all taking part in the ceremony wade out with her to some depth. On gaining deeper water the whole party go through a grotesque "goose-waddle-like" dance, flapping their arms, which are kept bent at the elbows, alternately at either side, and, in so doing, splashing the water up over their bodies with the production of a peculiar hollow-sounding noise.

Another refrain is now chanted: "*A-lö-lö-lö,*" and when the last syllable has sounded all the bathers dip under the surface of the water, the same thing being repeated many times.

The third part of the programme, following directly upon the washing, is the smoking of the young gin. A fire is made on shore, and when a good blaze has been secured, a large heap of green grass and leaves, previously steeped in water, is piled upon it. On this the old gin seats herself, and on her lap, with legs astride, the young gin. More grass and leaves are piled on the heap, and the vast volumes of smoke that are generated completely hide both women from view. The object is that the smoke shall thoroughly play upon the genitalia of the girl, the process being facilitated by the manipulation of the old gin upon whose lap she is seated. This event finished, the principal ceremony of initiation is concluded, and the novice is led into the bush by the old women, returning with them to camp the same day. Through the period the girl's diet is restricted during the pleasure of the old gin. She is not allowed to eat snake, dugong, monitor *(Varanus sp.)*, turtle, etc., but may have crab.

No cohabitation takes place between the young gin and her husband for about four months after her initiation, but at each recurrence of the menses she cleanses herself with water, without repetition of any ceremony. The man must not receive food from her during these periods, as otherwise he would become subject to severe pains in the stomach, and become readily susceptible to injury. If, for instance, in their excursions hostile blacks were encountered, he would

* It is interesting to note a similarity of these proceedings recorded from the western islands of North Australia: Reports Cambridge Anthropological Expedition, Torres Straits, vol. v., 1904, chap. vi., pp. 201 *et seq.*

be certain to become the victim of any spear thrown by them.

A subsequent secret corrobboree of initiation, about which very little is known, takes place several years later, and corresponds to the *Mollinya* ceremony of the men, which is described below.

In conformity with the absence of sub-incision among these western tribes, the corresponding mutilation of the female is not in vogue.

Second Initiation Ceremony of the Larrekiya Youth—The Mollinya.

Some years after the *Böllier* ceremony comes the *Mollinya*, after which the subject becomes entitled to join in the discussions of the old men. On this occasion the youth is under the care of an old man, and is decorated in a somewhat similar way as in the first ceremony. The broad, white forehead band, or *galambaua*, marked transversely with four stripes of red ochre, and the similar appendages from head, elbow, and waist are worn. He carries, in addition, a plume of cockatoo feathers, known as *biamörre*, in his hair. See pl. ii. The performance—at which only the old men (all initiated *Mollinyas*) are present, while no mention of the ceremony is made to the women—commences soon after sundown, and ends before midnight. The youth, in the presence of his guardian, must remain silent, and with downcast eyes. A wailing chant is sung in low, broken accents: "*Makolär manga, makolär, ä är, maklär, immanga.*" No beating of sticks or hands accompanies the tune, and no definite ceremonial dance follows.

After the *Mollinya* ceremony, cicatrices may be added on either side of the abdomen, each cut extending to under halfway across the front.

During the time between the *Böllier* and *Mollinya* rites, bustard, flying-fox, and yam are forbidden as articles of diet, but at the latter corrobboree he is invited by the old men to eat. The man believes that even if he ate one of these foods secretly during the forbidden period, the medicine-man would, on his returning to camp, at once detect it in his stomach. And having thus disobeyed, the medicine-man would have perfect right to run a spear through him, or compel him to eat certain things, from the effects of which he would die. But, although he must not eat the forbidden foods, the youth is not forbidden to hunt them, so long as he delivers up the spoil to the old men. These rules are strictly observed, and, whenever privileged members have eaten flying-fox, the bones are carefully collected and burn-ed, to make certain that no boys could possibly have access to them.

Corrobborees and Friendly Meetings.

At ordinary corrobborees, other than those connected with the initiation ceremonies, a tall, conical headgear is made with grass, bound round with fur-string, the outside being smeared with pipeclay, to which vegetable-down is made to adhere with viscid sap. This conical structure fits over the hair, which is drawn up into a point and smeared with pipeclay; over it the grass-binding fits like a helmet. A small, pointed stick, or bone, carrying a plume of emu feathers, is inserted into the top, and the whole of the wearer's face, with the exception of the eyelids and lips, is covered with vegetable-down. The helmet is known under the following names in the different tribes:—

Larrekiya—*medlemö.*
Wogait—*ürak.*
Sherait—*wennu.*
Berringin—*nurö.*

The plume at the apex as *gurrumberring, murun, mokulling,* and *ngodeji,* respectively.

At various friendly gatherings of groups and tribes, chants imitative of other events, sounds, and objects form a prominent feature. Of these a few typical cases will be mentioned. A corrobboree of the wailing of women is one of the most popular amongst the *Larrekiya* and *Wogaits.* It runs:—

Arada kadji mara uda kayan yan; arada kadji mara uda kayan mölle ulpululu mölle, jangaji karra kanjin mada da nga la ulmin ja jandadbi karra kun kun mukale la enbulukdi bana mölle mara kanjinmada da buluk di bölle arada kadji balla.

Lö—e lö lö—e lö—ö lö—ö la Kanjin mada danö wüdningi juan madji karra kunkul mukana mölle enbuluk di bana mölle kanjin mada.

In the above, the line commencing with *lö—e* is sung in a plaintive manner, and is strongly suggestive of the wailing of women at a mourning ceremony, which, indeed, it is intended to represent. As a marked contrast to these seemingly solemn proceedings, the termination is one of merriment and laughter, in which there are many interjections and criticisms as to the imitative skill of one another in the production of effeminate sounds.

An accompaniment is performed by one member on the wooden trumpet,* into which he makes droning sounds that

* See description p. 48 and fig. 63.

may be represented by the syllables, "*Tib bu, tib bu, tib bu a.*" Other performers beat time with their "music-sticks," one long beat being followed by three short taps in quick succession.

In the corrobboree of the frog the following unusually pleasing chant is frequently repeated*:—

Iwoggiama wogien, woggiamana wogien, immangana jellerrima wogien. Imbaka kwuerakwa wogien. Imbelluoluodö wogien.

Yi kwa e kwa, yi kwa e kwa. I wogien. Immangana jellerrima wogien. Imbak kwuerakwa wogien. Imbalualuodö wogien.

Up to the second repetition of "*wogien*" the syllables are uttered with subdued voices, then all members join in heartily. The verse is sung and immediately repeated, with the omission of the initial *Iwoggiama wogien* and the final *wogien*, the voices, moreover, subsiding to almost inaudible softness at the finish.

The "*Yi kwa e kwa*" is sung in imitation of the croaking of a frog, the following "*I wogien*" being extended to five syllables by reduplication of the final syllable.

The accompaniment on the trumpet is "*Tip bu, tip bu, tip bu, tip paū ā, tip paū ā, tip paū ā,*" the last of which sounds something like a "Hoop la!" Music-sticks are used by all, the taps being equally spaced and of uniform strength.

Corrobboree of the arrival of a boat:—

Ima di mana, ima di mana, ima di mana, ima di mana nga kara ra ungöni di ma di.

Corrobboree of the visit to a strange tribe or country:—

Ana ni lai, ni lai; ana li lai, ni lai laie ö kondön linmai endo; di-di, di-di, di-di, di-di, di-di, dia.

The latter chant is accompanied on the "trumpet" with "*Tidjnaror tebor,*" *ad infinitum.* It is succeeded for some considerable time by the clinking of the musical sticks alone.

To become gifted with a sonorous voice is one of the ambitions of native youth. The large *Cicadæ* are admired for their vocal powers and endurance in song. They are, at times, caught and sucked, in the hope that similar virtues may in this way be acquired.

When a man who has been absent on a mission returns to his camp, or arrives at that of a friendly group, he sits isolated from the men for some time, everyone present main-

* *Cf.* Report Government Geologist: Parl. Paper No. 55, Adelaide, 1906 (Journal by L. C. E. Gee, p. 23).

taining strict silence. Eventually the most influential member begins conversation in a low voice, in which other members join one by one. The event culminates in singing and dancing.

Fig. 5.

Fig. 6.

Often the visitor displays, for the information of his friends, the emblem of his mission, or person, painted in pipeclay and ochre upon his chest. If, for instance, he has been about on a turtle-hunting expedition, he returns ornamented with a large design representing a turtle. A striking difference of design is made in distinguishing between a fresh-water (fig. 6) and a salt-water turtle (fig. 5). The annexed figures are *facsimiles* of native sketches.

Superstitious Belief in a Nocturnal Monster.—All the tribes encountered believe in the existence of a creature that roams about, principally at nighttime, and is the terror of the blacks, stealing upon them in their sleep and squeezing their ribs from behind. The term "devil-devil" has been generally assigned to this being by the whites, and has become of common use among the semi-civilized tribes. Among themselves, they speak of it as "*Birrawulidda*" in the *Larrekiya*, "*Winmallon*" in the *Wogait*, "*Barang*" in the *Sherait*, and "*Ngauit*" in the *Berringin*. The "devil-devil" is supposed to possess no nose, two blanks for eyes, and two additional, powerful visual organs at the back of the neck, by means of which he can see a very great distance. When he makes a corrobboree with his companions, he is supposed to use his shinbone as a wooden trumpet, which, after the ceremony, he replaces in its proper place. At daytime he usually camps in holes, or caves, and his tracks are often found by the blacks, who, when they imagine he is near, become stupified, as though intoxicated. When a man has been visited by the evil being, and has had his ribs squeezed, the medicine-man is summoned. The latter ties a stick along the sufferer's back, and requests him to remain lying on the ground until the pain has passed away.

Some of the powerful old men of the tribes profess to have stood face to face with the spirit, away from camp, and to have asked him his name, whereupon he replied, "Me devil-devil," and disappeared.

When a blackfellow has been visited, imaginatively, during the night by the spirit, he does not inform his camp mates of it until the morning. At times the magic influence exerted by the monster over the blacks has the effect that they fall into a stupor, during which they cannot recognize men of their own clan; and, if such a one were to endeavour to enter the camp of a man in that condition, the latter would threaten to kill even his father, unless awakened from his fit.

Meeting Strangers.—The approach of a tribe to a party of strangers, such as white men, is made in a definite and formal manner, that is also in practice in Central Australia, and appears generally adopted throughout the continent.* One or two of the most influential old men draw near to the strangers, and, in so doing, push before them a defenceless child, upon whose shoulders both men place a hand, as though guarding their bodies behind the exposed figure of an innocent.

Wilson, in 1835, wrote† that Captain Barker used every endeavour to induce the natives to come into the camp at Raffles Bay, but without success, until a little child, belonging to one of the soldiers, went and led in the chief, who was evidently under great alarm, by the hand.

While out on a flying trip in the Tomkinson Ranges, in Central Australia, our party came unexpectedly upon three women, who were busily engaged in cooking a snake, and had not heard the approaching camels. On seeing them in close proximity, two gins immediately fled. The third, with an expression of most pitiable terror in her face, seized her breasts, one with each hand, and forcibly squirted her milk in the direction of the white men.

Asking later the meaning of this strange act, we found that she wished thereby to demonstrate that she was the mother of an infant, in the hope that the white men would not, under such circumstances, do her any harm.

As an important geographical extension, I add that Dr. Roth and Mr. Chas. Hedley have informed me that when they traversed Mornington Island, in the Gulf of Carpentaria, they also came suddenly on a camp. All natives fled, except some helpless pregnant women, who immediately began to squirt milk from their breasts, as I have described. It, too, was evidently an appeal for mercy, and an advertisement of their condition. Apparently, therefore, the custom is widespread.

Hunting.

When hunting, the ochred bodies of the persons act as a protective colouration. The "black boys" employed by bushmen well know the value of the inconspicuous colour

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* *Cf.* T. L. Mitchell: Three Expeditions into the Interior of Eastern Australia, vol. i., pl. xii., p. 194.

† Narrative of a Voyage Round the World, 1835, p. 74.

of their skin when trying to creep within range of game, and they always take the precaution to remove any articles of civilized clothing. The effect is increased by smearing their bodies with the mud of the adjoining country.

The assimilation of the colour of their natural skin to that of "rust-coloured" boulders of granite and other rock is marked, not only in these tribes, but throughout the continent. At Opparinna Spring, in the Musgrave Ranges, one day, had it not been for the alertness of my camel, I should have ridden over the huddled figure of a girl who was hiding from her mates among the numerous rocks, which she endeavoured to resemble by assuming the recumbent position and tucking her head and arms between her knees. The colour and form of her back corresponded so nearly with those of the rocks, that it required more than a casual inspection to recognize a living human figure.

A hunter often awaits his prey in ambush in a waterhole by concealing every part of his body under water, except his head, and, when occasion requires, with nothing but his nose visible above the water. When pursued by foes, he seeks refuge in a similar manner, and in that case takes every care that his breathing does not betray his presence by causing a ripple upon the surface of the water. After the Daly River massacre* the few natives that escaped the rifle-bullets of the avenging whites saved their lives in this manner.

The kangaroo is hunted with the spears, known as *malligirrima* and *dawingwa*. Four or five men post themselves in concealment along a well-known and frequented pad that is utilized by the game on its way to a waterhole, or cover. A large party, including men, women, and children, disperse in the direction where kangaroos are known to be grazing. On drawing near to the animals, all the beaters begin to sing and shout, "*Yē-wo o-ho, yē-wo-o-ho,*" as they dart along through the bush, and continue until a kangaroo is sighted, which is immediately pursued with excited cries of "*Yakäu, yakäu.*" On hearing this shout, the men in ambush become alert, and as the prey leaps by, along the pad, the nearest of them instantly rises to hurl his spear.

If he is successful in his aim he raises a loud and shrill shout of "*Käu,*" as a signal to the driving party, who then assemble at the spot.

A native considers that the most effective part in which to wound a kangaroo is in the hind leg, particularly if the bone should be broken. If struck in the upper part of the

* See Report Government Geologist: Parl. Paper, No. 55, Adelaide, 1906.

body the animal travels for some distance, and requires tracking to secure it.

The large frugivorous bats *(Pteropus gouldi)*, known as flying-foxes, which are nocturnal in habit, are fond of congregating during the daytime in very large numbers in the foliage of bamboos and mangroves, where they hang, head downwards, until dusk. It is an easy matter for the blacks to approach them, and fell a sufficient number with sticks and stones to make a feast. The animals that fall stunned to the ground are gathered and bitten, one by one, in the neck and rump, by the hunters—in the former spot to kill, in the latter as a preliminary test of condition. The restriction of this diet from the uninitiated has already been mentioned.

Emus are most readily killed by climbing into the branches of a tree, the fallen seeds of which are known to be eaten by the birds. The blackfellow ascends the tree in the early hours of morning, and awaits his chance, keeping perfectly silent and motionless when an emu draws near. A special, heavy spear, of the *malligirrima* type, known as *nimmerrima*, is held in readiness. If the bird comes to a spot immediately below the concealed native, the weapon is thrown (without a spear-thrower) in the manner depicted in fig. 7; if, however, it is at some distance off, the spear is held in a slightly different manner, as is shown in fig. 8.

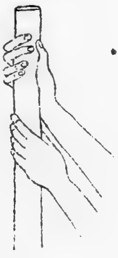

Fig. 7.

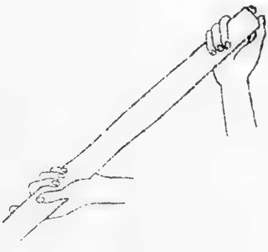

Fig. 8.

Large flocks of wild semipalmated geese *(Anseranus melanoleuca)* visit the same localities periodically. The blacks have got to know these localities well, and, during the absence of the birds, make an excavation in the ground, and cover it over with twigs, paper-bark, grass, and soil, leaving only one or two small lookouts open. A couple of natives sit in this hole and await the return of the geese. As soon as a head or leg of a goose comes near to the window, it is seized, drawn below, and its neck wrung. In this way many birds may be secured.

After the first appearance of wild geese at the billabongs and lagoons, the women are not allowed to eat of their meat, believing that if they did so the geese would become lean and bony.* Only after the geese have settled for some considerable time in a certain locality are the gins allowed to partake of this food.

The clever imitation of the cries and calls of these birds, a "*ngá ngáng, ngăng-ngăng-ngăng*" induces large numbers of them to be attracted, at dusk, close to the native, who sits in the branches of a tree, and kills the birds with a stick.

These birds can also be lured, by imitating their call, so close to a native seated motionless in high grass that they can be actually grasped by hand.

The note of the whistling duck *(Dendrocygna eytoni)* is also accurately reproduced, by which flocks of them are attracted and killed with a throwing-stick while hovering round the hiding native. Cockatoos, plovers, and other birds are secured in a similar manner.

The presence or whereabouts of crocodiles *(C. porosus)* and dugongs *(Halicore australis)* in water is traced by the swirl and bubbles produced at the surface, and they are speared from a raft or canoe. A dugong is further detected, when feeding below the surface of the sea, by noting the nibbled portions of seaweed rising to the top. Young crocodiles are caught by hand from the bows of a canoe by cautiously drifting upon them as they float in the water.

The natives explain that the teeth of young crocodiles have not hardened sufficiently to do harm, and they even show no fear while swimming about among full-grown individuals.

When a dugong has been killed by being speared from a canoe, the craft is submerged, the occupants swimming alongside and pulling it under the floating carcass of the prey. The water is then bailed out of the canoe, which rises, and lifts the dugong with it, and it is rowed ashore by the hunters.

A turtle is caught by diving after it from a canoe, with a line, and passing a slipknot round one of its paddles, when it is hauled to the surface. If the head of a swimming turtle be seized and held upwards towards the surface of the water it is helpless so far as escape by diving is concerned. Harpooning is also widely practised.

In the folklore of the *Larrekiyas* the fresh-water turtle, known to them as *pennimell*, once lived in the sea; and the

* *Cf.* Stretton's remarks on the eating of flying fox: Trans. Roy. Soc., S.A., vol. xvii., 1893, p. 240.

salt-water species, which they call *dorl-lurre*, in fresh water. One day the long-necked *pennimell* came out of the sea, and said to the then fresh-water *dorl-lurre*, "I can find nothing to eat," to which the latter replied to the same effect. A mutual exchange of territory was therefore agreed upon.

Fishing.

Fishing is one of the principal occupations of these coastal tribes, consequently a variety of methods are in use.

Fish are caught by building barriers* of rock across the entrance to small, shallow bays, which, upon recession of the tide, retain at times large numbers of fish, either high and dry, or in very shallow water. Such structures were noted particularly at Cape Ford and Hyland's Bay, in *Berringin* territory. As a modification of this device, barriers of paper-bark and branches, stayed by vertical rods driven into the sand at short distances apart, are erected across the beds of temporarily-flowing waters, such as the McKinlay and Cullen Rivers. After the passing of flood-waters many fish are retained by the obstruction. It may be mentioned that these fish, which are often of very considerable size, live, during the dry seasons, in the permanent waterholes that occur at intervals along the river courses.

Those fish which are left behind in comparatively shallow holes are captured by a party of natives, who enter the pool at one end and, as they move in a body towards the other end, with much splashing, shouting, and beating with sticks, drive the fish to the shallow water there. Then, with a sudden rush, and before the fish can regain deeper water, many are retained by mud and captured. See pl. viii.

When the water becomes very turbid by this agitation the barramundi *(Ceratodus)* has the peculiar habit of rising to the surface and throwing itself upon the mud banks, to fall a prey to the native. This turbidity is very apparent after a mob of wild cattle have visited a comparatively small water, when these fish can be gathered in large numbers, or else they fall victims to numerous birds of prey.

In the holes left along the seashore they are caught in a slightly different manner. Several natives sit at one end in shallow water, with their legs bent at the knee, spread apart, and feet drawn in under their buttocks. Another party walk towards them from the opposite side, driving the fish before them in the manner described. The fish endeavour to pass or hide underneath the limbs of the sitting

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* *Cf.* W. E. Roth: Ethnological Studies, p. 95, pl. xi., fig. 224; and W. G. Stretton: Trans. Roy. Soc., S.A., vol. xvii., 1893, p. 241.

party, but as soon as one comes in touch with the naked body it is cleverly caught by the native's hands, killed by crushing its head between his teeth, and thrown on to dry land. This method was observed among the *Ginmus*.

When sawfish *(Pristis* sp.) are seen in shallow water off the beach, the natives cleverly seize them by the tail with their hands, and before any harm can be done hurl them high on to shore.

Fishing-nets are made by first forming a ring, about five feet in diameter, from the long shoots of *Spinifex* growing in the sand-dunes on the coast. Two pairs of these shoots are twisted, two-and-two, one about the other, and bent into semi-circular shape, the two ends of each twisted pair being tied together with vegetable string, thus completing the circle (as shown in fig. 9). Round the inside of this hoop is tied a circular net, which is made of long vegetable strands, usually derived from hybiscus bark. The knitting of this meshwork is done by hand, without the aid of tools. The successive stages in the manufacture of the net are most readily explained diagrammatically, and are given in the following figures, the knitting in the last case being repeated indefinitely from mesh to mesh, until the required dimensions have been attained.

Fig. 9.

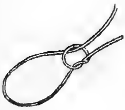

Fig. 10.

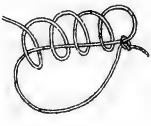

Fig. 11.

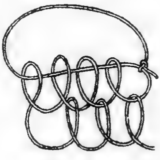

Fig. 12.

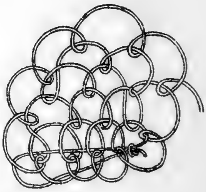

Fig. 13.

When this net is employed for fishing, two natives, usually females, seize a side of the rim each with one hand, wade out to a suitable depth, pulling the net along between them, its mouth being inclined at an angle so that the lower side projects beyond the upper. See fig. 14. The natives all the while beat the water on either side to drive the fish into the net, the mouth of which, as soon as one is noticed to have entered, is quickly turned up into a horizontal position, and the fish bagged.*

* *Cf.* W. E. Roth · Ethnological Studies, p. 9

Fig. 14.

Two types of fish-hooks are employed, but their use is becoming more or less obsolete from the use of metal hooks obtained by barter. The simpler form is cut from a flat bone of kangaroo, or from pearl shell, and has a slight notch at its upper end to permit of the string being securely tied to it.

In the other pattern two bones are tied at an acute angle with vegetable string secured with resin or wax. See fig. 15. The shorter piece is previously pointed at its free end; the longer possesses an enlargement at one extremity, to which the line is fastened, usually as follows:—The string is folded at one end into a loop, through which the bone is passed (see fig. 16), and it is kept in place by binding another string, as shown in fig. 17. The line is attached to a long rod.

Fig. 15.

Fig. 16.

Fig. 17.

The common form of fish-spear measures from ten to eleven feet in length, and consists of a single shaft of bamboo, tapered slightly at its thicker end, into which three slender, pointed rods of ironwood *(Erythrophlaeum laboucheri)* (or, in the semi-civilized tribes, fencing-wire) are inserted, the attachment being tightly bound round with string. Large fresh- and salt-water fish are speared with this weapon, including the barramundi *(Ceratodus)* and stingray *(Trygon* sp.). No spear-thrower is employed, the spear being held poised until the prey comes within close range.

As a convenience in carrying large fish some distance to camp, special carriers are constructed by bending five or six dry reeds into loops, and binding the free ends together circumferentially into the form of a handle. The fish is inserted lengthwise into the loops, which are spread apart to receive it. See fig. 18. Shell-fish and crustaceans form daily meals.

Fig. 18.

Fig. 19.

An ingenious device is resorted to for collecting the honey of wild bees from inaccessible fissures in rocks and hollow tree-trunks. A long, thin rod is chosen, and to one of its ends a tassel of vegetable-strands is tied. See fig. 19. Holding the stick at the opposite end, it is inserted into the cleft or hollow containing the honeycomb, and worked about in it until an appreciable amount of honey has been absorbed by the fibres, when it is withdrawn and the honey eaten, after which the process may be repeated.

Wilson observed* a native of Raffles Bay squeeze into a basin of water honey out of a meshy, fibrous bundle, formed from the inner bark of young trees, then dip the bundle into the water and suck it. No doubt this bundle of fibres was a modification of the form I have just described, and is known as *galmarrua* to the *Larrekiyas*. It was observed on the Victoria River.

When about to burn down tracts of dry grass and reeds to obtain snakes, lizards, and other small game, the men cut a stick from a tree, with a branch at one end cut short so as to form a hook. Into this hook they wedge a little straw and set fire to it; then, holding the burning end to the dry grass, they run along, pulling the stick after them, the hook being held so that it continually gathers fresh fuel as he proceeds.

Cooking of Game.

The legs of an animal to be cooked are broken and tied together in pairs with hybiscus fibre. The carcass is opened at the side to remove the entrails, and an incision made in the anus to clear it. In the case of a kangaroo, the tail is cut off and cooked separately in ashes. When thus prepared, the carcass, the skin of which is not removed, is placed in an oven constructed as follows:—A fire is burnt over a shallow excavation in sand, and upon the red-hot coals are placed lumps of ant-hill earth to be heated. On them the animal is laid, covered first with paper-bark, then with sand, when it is allowed to cook.†

Fire-Making.

When by accident, such as a sudden tropical deluge, the "fire-stick" becomes extinguished, a fresh flame is kindled by the ordinary frictional process of twirling a rod of dry wood between the palms, with its lower, slightly-pointed end against another piece of wood held to the ground with the feet, the operator being in a seated position. See fig. 20. A little

* Narrative of a Voyage Round the World, 1835, p 99. See also, Keppel: A Visit to the Indian Archipelago, 1853, vol. ii., p. 168.

† A similar method is reported to have been used by the extinct Adelaide tribe. J. P. Gell: Tasmanian Journ. National Science, etc., 1841; reprinted in pamphlet form.

Fig. 20.

powdered material is usually strewn upon the hole in the basal piece of wood. Seeing that this method of producing fire depends upon friction, I was surprised to notice a curious practice amongst the *Larrekiyas*. When, with the twirling stick, the operator had bored out the depression in the horizontal piece, he squeezed the tip and sides of his nose with the finger and thumb, by which means a quantity of greasy matter was expressed from the sebaceous glands. This he scraped together under the nails of his index and middle fingers, and placed the mass upon the ankle of his left leg. Then, after resuming the rotating movements, so soon as the end began to smoke, he touched this against the greasy lump on the ankle, and continued the twirling.

The "sawing process,"* in which the edge of a flat piece of wood is worked by hand backwards and forwards along a groove, transversely to the length of a split piece, in the cleft of which easily ignited material is packed, is also in practice. See pl. x., fig. 1. A peg passing through the cleft pins the basal part to the ground at one end, while the other is held

* See W. E. Roth: Ethnological Studies, p. 105, pl. xii., fig. 245. H. Basedow: Trans. Roy. Soc., S.A., vol. xxviii., 1904, p. 27.

by the operator's foot. The method is very apparent in pl. x., fig. 2, the original of which was given to me by Mr. W. Holtze.

Smoking.

The habit of smoking in these districts, as elsewhere in Australia, has become a passion among the tribes that come into contact, directly or indirectly, with Europeans and Asiatics. When the original supply of tobacco has run out the pipe of one of a group of men is crushed between two stones, and the powder and ashes thus obtained smoked in other pipes. This is repeated down to the last pipe, when it, too, is crushed, and the powder rolled up in dry palm-leaf and smoked like a cigarette.

They have also invented a pipe of their own by breaking off the protoconc of *Turritella cerea,* and filling tobacco into the mouth of the last body-whorl of the shell. The smoke is then inhaled by suction through the convolutions of the shell.

Opium pipes are made out of empty bottles. Having secured a bottle, a native will patiently tap round a certain spot with a pointed implement until he has drilled a small hole through its side. A little opium (usually the third-hand remnants from the pipe of a Chinaman) is placed beside the orifice, ignited, and the smoke drawn into the mouth through the neck of the bottle.

Habitations.

As in Central Australia, habitations are only used under extreme climatic conditions.

The usual plan is to construct a dome-like framework or skeleton of flexible branches as depicted in the sketch (fig. 21), the joints at each intersection being made secure with strands of hybiscus bark. This structure* is covered with paper-bark and grass, leaving the one side open for access. See pl. ix. The floor of the interior, too, is carpeted with the same material, with the exception of a small space left for the fire. The structure measures 5 ft. by 5 ft. by 4 ft. high, and is called

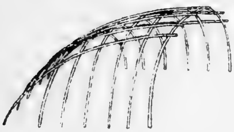

Fig. 21.

* Stokes found similar structures at Cape Hotham, and also at King's Sound: *Vide* Discoveries in Australia, 1846, vol. i., p. 406. Wickham observed huts on Depuch Island, off the north-west coast of Australia, which "were constructed by fixing boughs and twigs in the ground in a circular form, and joining the smaller ends overhead in the form of a beehive": Journ. Roy. Geogr. Soc., London, vol. xii., 1842. See also W. E. Roth: Ethnological Studies, pp. 105 to 107; pl. xii.

albirrekpin by *Larrekiyas*, *bijijilkminit* by *Wogaits*, and *enduk* by *Sheraits*.

In camping-places where mosquitoes are very troublesome the dome is completed by bending the rods down to earth on all sides, and covering the whole surface with bark. Four small openings are left along the base to serve as doors, and a hole made in the top to allow passage of the smoke that is accumulated in the hut for the purpose of keeping out the insects.

Provisional shelters against rain are made by cutting a big sheet of bark from the stringy-bark. To do this the bark is chopped through circumferentially in two places about seven or eight feet apart, and slit longitudinally between the two incisions, after which it is easily removed by leverage. See fig. 22.* The sheet is folded transversely along its centre, and stood on sand in tent-like fashion.

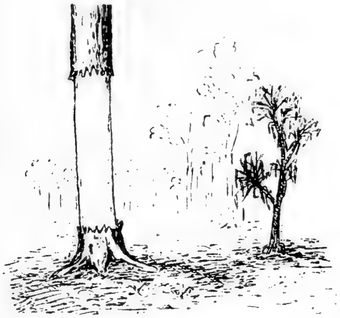

Fig. 22.

Sun-shades are formed by erecting two vertically-forked poles, in the forks of which a horizontal rod is placed. Against the latter, green branches are piled at an incline of about 45 degrees, and the fires lit beneath.

As a variety may be mentioned that found by Stokes† north of Roebuck Bay, and described as a slight, rudely-thatched covering, placed on four upright poles, between three and four feet high.

Stokes writes of natives covering their naked bodies with sand for warmth. A more usual method is to lie upon, and cover themselves with, paper-bark. I have, however, noticed them cover their naked forms with sand as a protection against the attacks of mosquitoes.

Weapons and Implements.

The spears that were observed in use by the North-western coastal tribes will be considered under the scheme

* *Cf.* R. Brough Smyth: Aborigines of Victoria, 1878, vol. i., fig. 239, p. 409.

† Discoveries in Australia, 1846, vol. i., p. 101, figured.

of classfication of main types of Australian spears, as described by Spencer and Gillen.*

Type (4).—Single-pronged, multi-barbed spears, with the barbs on one side only. The shaft of heavy or light wood:

This is one of the most common types, and usually has the shaft of light wood. See fig. 23. The variations in length

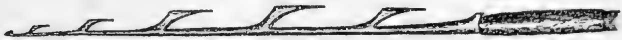

Fig. 23.

of the barbs are marked; the longer they are the less effective is the weapon for hunting purposes, but the more prized as an article of show on special occasions. They measure from a fraction of an inch to several inches, while the length of the spear is from ten to eleven feet, of which the barbed head occupies about two feet.

The shaft is almost invariably made of bamboo, the head being of heavy dark wood, the latter being inserted into the cavity of the thicker end of the slightly-tapering rod up to a small shoulder cut into the head as a short, blunt barb. A firm attachment is effected with beeswax. At the opposite end a small hole is left by cutting the reed a short distance beyond a septum. Sometimes this end is coated with a thin layer of beeswax, and wound round with vegetable fibre or fur-string. In the *Wogait* and *Berringin* the hole is lined on the inside with paper-bark, which is further firmly pressed down into it. This acts as a cushion, saving the point of the spear-thrower from wear. The *Larrekiya* do not take this precaution, but, on the other hand, make the points of their spear-throwers blunt; the former two tribes using a sharp one.

The spears are covered with red-ochre, and during special ceremonies are ornamented with white and yellow patterns.

Type 5.—Single-pronged, multi-barbed spears, with shaft of light wood or reed. The barbs are arranged along two or more sides of the head.

Spencer and Gillen, in describing a form of this type, state that it has evidently been derived from an original form with a long, simple-pointed head. This evolution is apparent

* The Northern Tribes of Central Australia, 1904, pp. 671 *et seq.* *Cf.* also the types described by Etheridge, from the Alligator River tribe: Macleay Mem. Vol., Linn. Soc., N.S.W., 1893, pp. 229-235.

in the following figured specimen (fig. 24) which may be the next stage to an unbarbed spear, with separate head, as defined by the above authors in type 3.

Type 6.—Multi-pronged, multi-barbed spear, with shaft of light wood or reed.

Fig. 24.

Fig. 25.

Fig. 26.

Fig. 27.

A spear eleven feet in length, with three equally-cut barbed prongs of ironwood attached to a reed shaft with resin and paper-bark.* The barbs are comparatively small, each prong containing from eight to eleven. See fig. 25.

An allied weapon is used by the *Larrekiya* and Port Essington natives, but it possesses only two prongs, which are of equal length, barbed on one side, the heads being so attached to the shaft that the sets of barbs point in opposite directions.† See fig. 26. The prongs measure fifteen inches in length, possess thirteen barbs, and are fastened to the shaft with beeswax and vegetable-fibre string.

Type 8.—Stone-headed spear, with the head made of flaked quartzite, and the shaft of reed.

This type is common. The spear is eleven feet long, the stone head varying in length from two to six inches. The stone is chipped from Ordovician quartzite that occurs in extensive outcrop on the Victoria River and elsewhere. The stone is attached with beeswax, resin, and vegetable string.

Type 11.—Short, light spears, with a thin, tapering point of hard wood and a reed shaft.

Common among all tribes on the north-west coast. Those of the *Larrekiya* and *Wogait* are decidedly more neatly finished than those of the *Berringin* and *Ginmu*. See

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* *Cf.* E. J. Eyre: Journs. Expeds. of Discov. Centr. Austr., vol. ii., pl. vi., fig. 2; and R. Etheridge: Macleay Mem. Vol., Linn. Soc., N.S.W., 1893, pl. xxxi., fig. 5.

† *Cf.* E. J. Eyre: *Op. cit.*, pl. v., fig. 3.

fig. 27. The spear measures five feet in length; the head or prong is made of mangrove wood.* It is employed principally for settling minor quarrels between two individuals, in which the opponents skilfully dodge the missiles, each dancing grotesquely in defiance to his opponent, by jumping from foot to foot, and holding the arms half-erect and bent at elbow and wrist, while the body is thrown forward and the head back.† See fig. 28. A "close shave" is greeted with a pronounced "irr."‡

Fig. 28.

This light spear, on hitting the ground, skips along the surface, and may be recovered uninjured. A large number of these spears is always available, owing to their easy construction.

Messrs. Spencer and Gillen state that this form of spear "is thrown by the hand, and never with a spear-thrower."§ This must not be regarded as applying to all tribes alike. So far as my observations went, spear-throwers of the type described on page 35 were used specially for spears of this type by all the north-western tribes, with the exception of the *Ginmu*, but there is no reason to doubt that these also use them.

Two varieties of this type must be added:

One is identical with the above in shape and design, but twice as large; the reed shaft measuring four feet and the mangrove head five feet in length. It is used for hunting and fighting; in the latter case, particularly, when a lubra is concerned.

* Macgillivray defines this type as spears, shafted with reeds, the smallest of which are no bigger than arrows: Narrative of a Voyage of H.M.S. "Rattlesnake," 1852, vol. i., p. 147.

† *Cf.*, "A single black would hurl his spears one after another at an opposing blackfellow, who would as adroitly avoid them, ducking his head, bending his back, or shifting slightly to one side." Parkhouse: Austr. Assoc. Adv. Science, vol. vi., 1895, p. 642.

‡ This exclamation seems general. Stokes records it of the Port Darwin natives as indicative of fright; also of the King's Sound tribe. *Cf.* Discoveries in Australia, vol. ii., p. 22, and "Muttered signs of approval . . . were given at any good throws or a particularly clever avoidance of the spears." Parkhouse: *Op. cit.*, p. 642. See also H. Basedow: Trans. Roy. Soc., S.A., vol. xxviii., 1904, p. 24, "a subdued 'irr,' partly expressing pain, and partly disgust or temper."

§ The Northern Tribes of Central Australia, p. 676.

In the second variety, a rare form, used by the *Mulluk-Mulluks*, the reed shaft and hardwood head are repeated, with the addition of a small, chipped chalcedony blade fixed with resin to the end of the latter.

Shafts of spears, if crooked, are straightened by holding the bent portion over a block of heated ant-hill earth, on which water is thrown to generate steam.

Fig. 29.

Spear-throwers.

The prevailing type of spear-thrower among the north-western coastal tribes is that shown in fig. 29. It is cut out of light wood, measures four and a-half feet in length; is flat and of uniform thickness (about an inch), both sides being slightly convex. Its breadth is over two inches at the handle, and tapers off to half-an-inch at the end to which the wooden peg is attached with resin. The haft is formed by rounding off the edges, and cutting into the sides of the blade at about four or five inches from the end; round this "grip," kangaroo tendon is often wound. The whole surface of the spear-thrower is coated with beeswax, charcoal, and red-ochre.

The implement is used in throwing all the larger types of spears, with the exception of No. 11, the thrower and spear being clasped by the right hand in such a way that the spear-shaft passes, and is held, between thumb and fore-finger, the remaining fingers holding the handle of the thrower. See figs. 30 and 31.

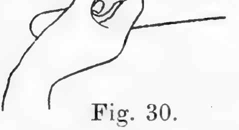

Fig. 30.

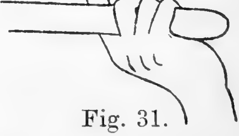

Fig. 31.

A similar though smaller pattern, cut out of light, soft wood, is not uncommon. It is not painted over with ochre or other material.

Another type is four feet in length, two inches wide, and very thin and flexible; the side that rests adjacent to the spear being flat, the opposite slightly convex. The peg that, in throwing, fits into the pit at the end of the spear is pear-shaped, and made of hard wood, being attached to the blade with vegetable string and beeswax. The handle is thick, circular in transverse section, tapers, and is covered with resin or wax, applied while warm. It is ornamented with rows of small holes pricked out with a fish-bone or small stick, as shown in fig. 32. Experienced men only use this type of "thrower."

Fig. 32.

The next form is used exclusively for throwing the small reed spears of type 11. It is known as *billiloa (Larrekiya)*, *dun (Wogait)*, or *jun (Berringin)*. It consists of a rod of hard wood, four feet in length, tapering slightly at either end. At one end a lump of resin is attached, and, while warm and soft, it is worked by hand into a blunt point, which fits into the hole at the end of the spear. At about five inches from the handle end a rim of resin is fixed, and from it towards the adjacent extremity a decreasing thickness of similar material. See fig. 33.

Fig. 33.

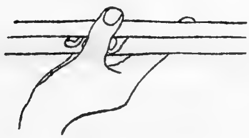

Fig. 34.

When throwing a spear, the hand is placed above the resin rim in the position indicated in fig. 34, the shaft in this case being held by the thumb upon the outer surface of the middle fingers, without the aid of the index finger. The handle end is frequently used to produce fire by the usual rotation process.

The type of spear-thrower described* by Spencer and

* The Northern Tribes of Central Australia, pp. 670 and 671, fig. 224.

Gillen as belonging principally to the *Gnanji* and *Umbaia* tribes, and consisting of a straight stick, with a human-hair tassel as a handle, is comparatively rare among the *Larrekiyas* and *Wogaits*, but has been reported to occur also at Port Essington by Macgillivray.*

Fig. 35.

NATIVE SWORD.

A weapon whose function may be compared with that of a modern sword is constructed of hard-wood in the shape shown in fig. 35. It is flat, with sides slightly convex, and the edges sharp, the length being about four feet. The constricted portion, serving as the haft, may be bound round with vegetable fibre and covered with beeswax to prevent the hands from slipping. This weapon is used both to strike and to ward off blows. When about to receive a blow, a combatant takes the precaution to keep his elbows down close to his body, as otherwise the force of his antagonist's blow may be sufficient to break his guard and cut his arm. His legs, too, he draws in to underneath his body. If his opponent strikes at his hands, he quickly shifts his weapon sideways to receive and guard off the blow.

This is, no doubt, the weapon described from Port Essington by Macgillivray † as a club of compressed form, resembling a cricket bat, with sharp edges, and used only at close quarters.

A fighting-stick, used as a two-handed weapon, from four to five feet in length, circular in section, and tapering

Fig. 36.

towards the handle end, is also used. See fig. 36. It is made of heavy wood, and covered with red ochre and various designs in white. The *Larrekiyas* call this weapon *gwanda*, the *Wogaits wangurre*, the *Sheraits jendönn*, and the *Berringins mileri*.

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* Narrative of a Voyage of H.M.S. "Rattlesnake," 1852, vol. i., p. 147.

† Narrative of a Voyage of H.M.S. "Rattlesnake," 1852, vol. i., p. 147. See also Brough-Smyth: Aborigines of Victoria, 1878, vol. i., p. 308; E. J. Eyre: Journs. Expeds. Discov. Centr. Austr., 1845, vol. ii., pl. vi., fig. vi; and R. Etheridge: Macleay Mem. Vol., Linn. Soc., N.S.W., 1893, p. 238, pl. xxx.

Although boomerangs are not known to these tribes, a small throwing-weapon (*damatha*) of a flat, spatulate shape, with small handle and sharp edges, is made of heavy ironwood, from six to twelve inches long. It is gripped by the handle with the right hand, and hurled edgeways, when it flies through the air with revolving motion, to hit its mark with either end; it is capable of making a severe wound on the victim. It is also sometimes used for killing game.

Food and Water Vessels.

The strong *coolemans* or *pitchis* of Central Australia, made of wood or bark, are not used by these coastal tribes, but are replaced by less durable articles made of paper-bark. Boat-shaped vessels of simple design are common. Sheets of paper-bark are folded once along the centre longitudinally, and the ends tied up with vegetable string.* See fig. 37.

Fig. 37.

In a more permanent type, made of stringy-bark, the ends are sloped and stitched together with cane, the sides stayed by three inverted hoops of flexible twigs, and bound crosswise by an equal number of vegetable-fibre ropes. The sides are kept rigid along their central edge by stitching rods to them. See fig. 38.

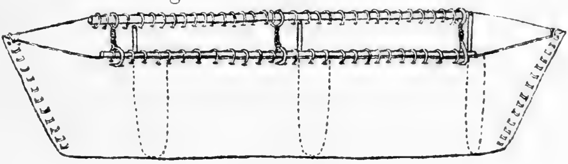

Fig. 38.

Provisional carriers are fashioned out of a long piece of bark by folding it once upon itself longitudinally, then twice across its length into the shape indicated by fig. 39. The women carry this implement either under their arms or by means of the sling described and shown on page 26. In it are stowed the gatherings of the day, such as roots and seeds.

* *Cf.* W. E. Roth: North Queensland Ethnography, Bulletin No. 7, Brisbane: by authority, 1904, p. 30, fig. 220.

Small articles are rolled up in paper-bark, the roll folded in its centre and tied together at the open ends with grass or fibre.

Infants, too, are wrapped in paper-bark and carried under the arms of their mothers.*

Fig. 39.

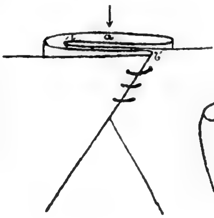

Fig. 40.

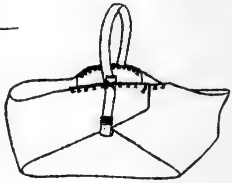

Fig. 41.

Water-vessels and baskets are constructed out of the leaves of the fan-palm. A leaf is folded at the edge opposite the stalk in the manner shown in figure 40, the overlapping folds *b* and *b'* being stitched together along the outer edge. The opposite side, containing the stalk, is treated similarly. The stalk is next bent round, and its end passed through the gap *a*, formed by the union of *b* and *b'*, when the end is turned back and tied to itself higher up, thus forming a convenient handle. See fig. 41. A similar type has been recorded from Port Essington by Macgillivray,† and a basket containing water from Luxmore Head by King.‡

Large shells of *Melo diadema* and *Megalatractus aruanus*§ are generally employed for drinking cups, small water vessels, and for bailing purposes; in the last-named case, both for scooping the water from a native well, and for removing it from their small canoes.

A hole is knocked in the body-whorl of these, and may be subsequently enlarged by grinding, so that part of the hand can pass through and grip the columella as a handle. The latter go by the names *maraba (Larrekiya)*, *jinbi (Wo-*

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* *Cf.* W. E Roth: Ethnological Studies, p. 183, pl. xxiv., fig. 436.

† Narrative of a Voyage of H.M.S. "Rattlesnake," 1852, vol. i., p. 146.

‡ Survey of the Intertropical Coasts of Australia, 1827, vol. i., pp. 111 and 112.

§ *Cf.* W. E. Roth: North Queensland Ethnography, Bull. No. 7, Brisbane: by authority, 1904, p. 29.

gait and *Berringin*), and *jinbiwa* (*Sherait*); the former by *malarinda* (*Larrekiya*), *ngaremang* (*Wogait*), *ngaremuk* (*Sherait*), and *Ounga* (*Berringin*).

Domestic Utensils.

An implement used for cracking the nuts of *Cycas media* consists of a piece of hard wood, about one foot in length, shaped like a cricket-bat. The nuts are held against some resisting surface, such as a rock or tree-root.

Pointed yam-sticks, similar to the Central Australian type, are among the belongings of the women of all tribes.

Open-mouthed, cylindrical baskets, with straight sides and curved bases, projecting upwards to a blunt cone inwardly, are plaited of flexible twigs after the pattern represented in fig. 42. The edge of the mouth is strengthened on the inside by a stouter twig, and by several vegetable strands on the outside, the upright bars of the pattern terminating between the two series, to which they are attached by cross-

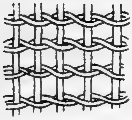

Fig. 42.

Fig. 43.

Fig. 44.

backwards and forwards three times, having its ends fixed at either side by separate ties. The intervening spaces between the teeth are interwoven and filled with beeswax. Thus the white enamel-surfaces only are exposed at the base of the black band, their roots being embedded in the wax. See pl. i.

Single teeth of the kangaroo are utilized somewhat similarly. After cleansing the enamel face as described, a lump of beeswax and a tooth are warmed at a fire; then the requisite amount of wax is scooped up with the root of the tooth, and worked with the fingers into a small globular mass round that end; the fingers during this process being kept greasy by rubbing them over the nose, thus preventing the wax from sticking to them. A little charcoal is next crumbled between two fingers, and pressed into the surface of the wax. A central lock of hair is squeezed into the wax of the ornament, which is worn over the forehead. See fig. 47.

Fig. 47.

The curls of warriors are at times partly embedded in beeswax and ochre, the head thereby becoming covered with numerous cylindrical bodies, from the lower extremities of which the ends of the bundles of hair spread out and curve upwards.

Necklaces.—Reference has already been made to the grass necklaces worn during initiation ceremonies (page 10). They are made by threading short segments of dry flower-stalks of grass upon thin fur* strings. About ten of such threaded strings, about eight inches in length, and bearing loops at the ends, are tied together at both ends by single pieces of human-hair string, which serve to tie the ornament round the neck. See fig. 48 and pl. ii.

Fig. 48.

Closely allied forms are made by substituting the grass segments by truncated shells of *Dentalium*, when as many as twenty-six strings are grouped together.

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* *Cf.* J. Macgillivray: Narrative of a Voyage in H.M.S. "Rattlesnake," 1852, vol. i., p. 146; and W. E. Roth: Ethnological Studies, p. 3, pl. xiii., fig. 264.

Chest-bands.—About forty thin vegetable-fibre strings are wound into a skein, like that used in the head band previously described. The circumference of each circle thus produced measures from three and a half to four feet, a certain proportion of which (nine to twelve inches) is bound round, circumferentially, so that it becomes a solid cord. The strings are divided into two lots, each of which is tied round near the main rope at either end for a length of about one inch, to keep the two halves separate. (See fig. 49.) The ornament is worn principally by women in the manner shown in figs. 50 and 51. The bound portion rests vertically along the back, and each of the two halves passes over one shoulder, diagonally across the chest and under the opposite arm, to meet the lower end of the vertical cord.*

Fig. 49.

Fig. 50.

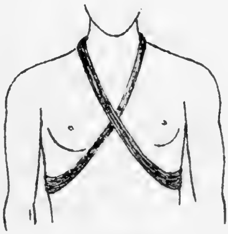

Fig. 51.

Smaller forms of this ornament are worn round the neck, most often by men. (See pl. ii.)

* *Cf.* R. Etheridge: Macleay Mem. Vol., Linn. Soc., N.S.W., 1893, p. 247; and Spencer and Gillen: The Northern Tribes of Central Australia, 1904, p. 694.

backwards and forwards three times, having its ends fixed at either side by separate ties. The intervening spaces between the teeth are interwoven and filled with beeswax. Thus the white enamel-surfaces only are exposed at the base of the black band, their roots being embedded in the wax. See pl. i.

Single teeth of the kangaroo are utilized somewhat similarly. After cleansing the enamel face as described, a lump of beeswax and a tooth are warmed at a fire; then the requisite amount of wax is scooped up with the root of the tooth, and worked with the fingers into a small globular mass round that end; the fingers during this process being kept greasy by rubbing them over the nose, thus preventing the wax from sticking to them. A little charcoal is next crumbled between two fingers, and pressed into the surface of the wax. A central lock of hair is squeezed into the wax of the ornament, which is worn over the forehead. See fig. 47.

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Fig. 49.

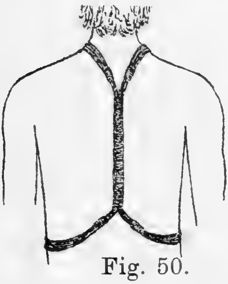

Fig. 50.

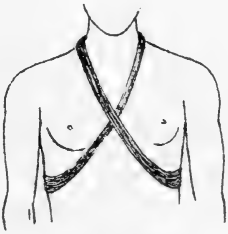

Fig. 51.

Smaller forms of this ornament are worn round the neck, most often by men. (See pl. ii.)

* *Cf.* R. Etheridge: Macleay Mem. Vol., Linn. Soc., N.S.W., 1893, p. 247; and Spencer and Gillen: The Northern Tribes of Central Australia, 1904, p. 694.

Armlets.—Reeds are split longitudinally into long, thin strips, which are scraped into pieces of uniform breadth with stone knives. In the latter process, one end of the strip is tied round the great toe of the right foot, from which it is passed between that toe and the next of the left foot, and the other end held in the left hand. The right hand is thus free to do the scraping. See fig. 52. The prepared strips

Fig. 52.

are neatly plaited into armlets that are worn by male and female round the upper arm above the elbow. See pl. ii. With age, these armlets become very tight-fitting, often pressing deeply into the flesh, and at times have to be cut on this account. The armlet has the following tribal names:—*Mirrakma (Larrekiya), tchellörra (Wogait* and *Berringin),* and *pinbin (Sherait).*

A broader armlet is used during certain ceremonies. It is one and three-quarter inches broad, and consists of about twelve narrow series of five plaited strips of cane, subsequently knitted into one by a close meshwork of opossum-fur strings, passing transversely from one series to the other, alternating over one and under the next.

Waist-girdles.—Waist-girdles are worn by men, and are made of twisted human-hair string. About thirty string circles are tied together at opposite ends of a diameter, thus forming, when pulled out, a bundle of sixty parallel strings. These are loosely twisted together to form a coil about two feet in length, which is tied round the waist by a similar

Fig. 53.

piece of string. This article serves, not only as an ornament, but is also used as a belt, in which various implements and weapons are carried, by thrusting them between belt and body. A warrior was observed carrying a stone tomahawk in this manner, and, in order to stop the swinging of the dependent handle in his movements, it was made to rest in the cleft of his buttocks. See fig. 53.

The spiral belts of stringy-bark have already been alluded to. Their length, when uncoiled, measures up to eight feet, their width three inches. See pl. ii.

Pubic Tassel.—In the description of various ceremonies the pubic tassel has been mentioned. It consists of a great number of twisted strands of opossum fur, bound to a central piece, which is tied to the waistband, either by two separate terminal strings, or by means of a thick, single one, passing from the top of the tassel. See fig. 54. In the latter case, the string ends in a large knot, that is simply tucked underneath the waistband.

Fig. 54.

The tassel is, at times, replaced by the shell of the pearl oyster *(Meleagrina margaritifera)*, two holes being, for this purpose, drilled near the hinge-line, to receive a string, whose ends are attached to a thick knot or small rod, passed under the belt. The shell is usually worn with its edge and rough exterior surface ground smooth.

Tribal Communications.

"Message-sticks."—A tribe, desirous of carrying on strife with its rival, sends to them a well-known message-stick by a messenger. Among others, two types prevail that are used according to whether the trouble is the result of disagreement between the men from sundry causes, independently of the women, or whether it has been caused by a woman—*e.g.*, a case in which a man has stolen a wife from a strange tribe, and the rightful owner wishes to avenge the theft.

In the former case, the "message-stick" consists of two equal internodes of reed, about one inch in length, squared off at the ends by cutting and subsequent burning on a red-hot piece of charcoal. These are tied together, side by side, with fur-string, which passes through the length of both reeds, and is knotted into a loop at one end. See fig. 55.

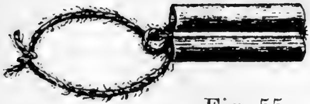

Fig. 55.

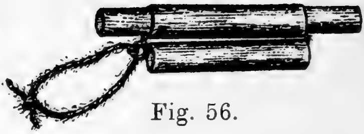

Fig. 56.

In the second case, where a woman is concerned, the "stick" is so far similar; but, in addition, has a longer and thinner internode passed through one of the other two, fitting securely into it. See fig. 56.

The messenger, dispatched by the tribe, fastens the stick underneath his forehead-band by its loop, and hurries to the party concerned. After it has been noticed by all present, he hands it to him who should receive it.

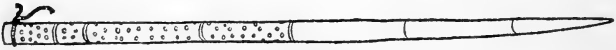

Fig. 57.

Fig. 58.

Other "message-sticks" that are known, at least to the *Larrekiyas*, *Wogaits*, and *Berringins*, serve principally for the summons and invitations to initiation ceremonies. One form (fig. 57), measuring from three to four feet in length, tapers to a point at one end, while at the other it has a piece of fur-string attached. The other (fig. 58), about eighteen inches long, consists of two segments, the base of one being made to fit into the other. They are both made from wood coated with red ochre, upon which designs are painted in white, in the patterns figured.

The call to initiation ceremonies of the *Wogaits* is the "*dell*" (or *diya* of the *Berringin*)—a message-stick of bamboo, from four to five feet long, painted transversely with alternate bands of red ochre, the glossy surface of the bamboo having been previously scraped in the parts that are to take the paint.

Silent Correspondence.

A conventional system of signalling and communicating with one another, at distance, by gestures, is understood by all the tribes.

Firstly, when the attention of a person a long way off is to be attracted for parley, the native stands erect, with his legs astride, throws his arms outwards, and continues waving them from a position in which, with elbows bent, the hands rest on the head, to that in which the arms are extended down either side of the body. While he is executing these movements the native keeps up a shrill, piercing shout, no matter whether the other party be within hearing distance or far beyond it.

Next, if he wishes him to approach: Maintaining the erect posture, both hands are thrown up above one shoulder, then swept, in extended condition, before his body to well behind it on the opposite side, and, in so doing, he bends his head and body forward from the hips.

If he means to indicate that he intends going to the stranger, the arms are thrown outwards from his chest in the direction of the latter person. Lastly, if the stranger is to remain where he is, both arms are held, bent at the elbows, with the open palms, which are directed towards the distant party, resting at about the same level as his head, or slightly above it. They are then swept round in a vertical plane to a position directly below the starting-point.

In every case the actions are repeated until the distant man has responded.

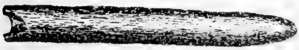

Fig. 59.

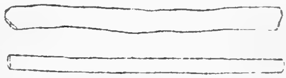

Fig. 61.

Fig. 60.

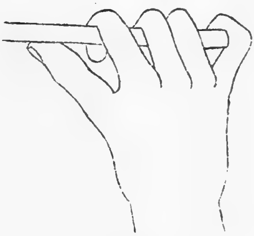

Fig. 62.

Musical Instruments.

The music-sticks that are used to beat the accompaniment of corrobboree chants consist of two pieces—one, about nine inches long, flat, rounded off at one end and notched at the other, is made of ironwood *(Erythrophlaeum laboucheri).*

See fig. 59. This is held in the left hand, as shown in fig. 60. The other, the beating-stick, is simply a smaller rod of circular section, made of mangrove-wood (*Rhyzophora* sp.). See fig. 61. It is clasped by the right hand in either of two ways: In one, the end of the rod is pressed against the little finger, all other fingers holding it, with the thumb underneath. See fig. 62. In the other, the end rests against the side of the middle finger, the thumb and index finger only holding it.

In performing, the ironwood is struck by the mangrove rod at about two-thirds its length from the notched end, producing a loud, ringing note.

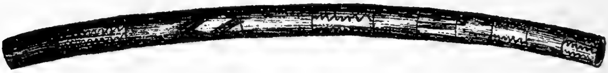

Fig. 63.

The bamboo trumpet, or drone-pipe, is made by cutting a fairly thick bamboo (*Bambusa arnhemica*), either curved or straight, into a length of from four to five feet, and breaking out its diaphragms, while green, with a rod and heavy stone. What remains of the septa is subsequently burnt out with a fire-stick. The outer surface is decorated by scratching designs upon it with a stone knife. See fig. 63.

When a bamboo is not available, a provisional "trumpet" is constructed by breaking the stem of a hybiscus and carefully removing the bark intact, in the form of a long pipe. This form does not last for more than a night.

The instrument is used as an accompaniment for corrobboree chants, the operator blowing into one end with a vibratory motion of his lips. Examples of the sounds produced are given on page 12. A droning, mournful succession of notes is emitted, and kept up without a break, the performer breathing all the time through the nostrils, as when a blowpipe is used. Before play, the pipe is usually moistened on the inside with water, which is said to improve its tone.

It is interesting to note that Wilson, in 1835, in referring to a native dance at Raffles Bay, wrote* that the music on that occasion was produced by one of the performers from a hollow tube.

Stokes found the instrument, referred to as "*ebroo*," in

* Narrative of a Voyage round the World, 1835, p. 87.

use among the natives at Port Essington in 1838, and wrote* that they blow through it with their noses. This, in all probability, is a mistake.

Leichardt also found it at Raffles Bay in 1845. He calls† it "*eboro*," and describes it as a long tube of bamboo, by means of which the natives variously modulated their voices.

The same instrument is also recorded from Port Essington by Macgillivray‡ as the "*ibero*," a piece of bamboo, three feet in length, which, by blowing into it, is made to produce an interrupted, drumming, monotonous noise, and by Keppel§ as a bamboo tube through which a monotonous sound is transmitted by the performer's breath; and Coppinger,¶ in the vicinity of Port Darwin, observed a hollow reed, about four feet in length, that was used like a "cow-horn," with the production of a rude burlesque of music.

More recently, Etheridge has described‖ these bamboo trumpets from the Alligator River tribes, of the Northern Territory.

The instrument is known to the various tribes as *mamil-lima (Larrekiya), kanbi (Wogait), molk (Sherait)*, and *kanbi (Berringin).*

Manufacture.

The shells** of large helices *(Xanthomelon pomum)* are much used in the making of weapons and implements. A hole is carefully tapped into the main whorl, leaving the edges of the fracture as sharp and abrupt as possible.

For rasping and smoothing surfaces of wood, the shell is held, by the little finger of the right hand, at the open end of the body whorl, so that the made aperture rests below the finger. Held in that position, the lower edge of the hole

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* Discoveries in Australia, Voyage H.M.S. "Beagle," 1837-1843 (London, 1846), vol. i., p. 394.

† Journ. Overland Exped. in Australia from Moreton Bay to Port Essington, 1844-1845 (London, 1847), p. 534.

‡ Narrative of a Voyage of H.M.S. "Rattlesnake," 1852, vol. i., p. 151.

§ A Visit to the Indian Archipelago, vol. ii., 1853, p. 163.

¶ Voyage of the "Alert," 1883, p. 204.

‖ Macleay: Mem. Vol., Linn. Soc., N.S.W., 1893, p. 242, pl. xxx., fig. 7, and pl. xxxi., fig. 6. See also T. Worsnop: Pres. Address Sect. Ethnology, Austr. Assoc. Adv. Science, 1895, vol. vi., p. 145, and "The Prehistoric Arts, Manufactures, Works, Weapons, etc., of the Aborigines of Australia," Adelaide, 1897, p. 155.

** *Cf.* W. E. Roth: North Queensland Ethnography, Bull. No. 7, 1904, p. 21, and figs. 109 to 115.

forms the rasping surface, which is only worked upwards. The main portion of the shell during this process, therefore, lies against the outer side of the palm. See fig. 64.

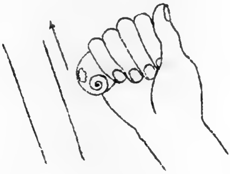

Fig. 64.

Fig. 65.

When the point of a spear or other weapon is to be sharpened, the prepared shell is held by the index and middle finger of the right hand, so that the puncture is underneath. The point of the weapon is then placed between the shell and thumb, which latter presses the point against the shell, the rasping being done only towards the body, in the direction indicated by the arrow in fig. 65.

A strong bivalve shell *(Cyrena essingtonensis)* is also used in the final process of chipping stone spearheads and knives. The umbonal portion of the shell, with the convex surface outwards, is held firmly by all fingers of the right hand, in such a way that the ventral edge is away from the palm of the hand. The latter border is pressed against the chipped edge of the stone head, gripped by the left hand, and by a careful wrenching of the right hand, in such a direction that the thumb moves downwards, the requisite chipping is accomplished.

For this final process, a fragment of quartzite or flint is often used, instead of the shell—that is, after the preliminary flaking of the stone. This is used in the same way as the shell.

A bivalve shell is also used for cutting wood. For this purpose the shell is held, dorsal surface upwards, between thumb and middle finger, the index finger passing round the umbo and convex surface. The ventral edge is placed against the piece of wood, which is held with the remaining two fingers. By combined pressure and half-circular forward motions of the right hand the wood is cut through. See fig. 66.

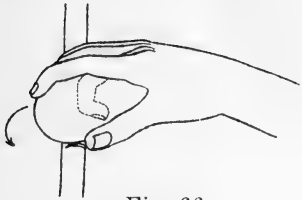

Fig. 66.

Fig. 67.

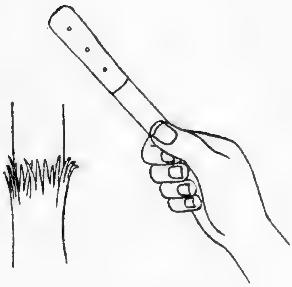

Fig. 68.

It is curious to note that if a native be given a steel knife, it will be used for cutting in much the same manner as the shell. The handle of the knife is held by the thumb against the base of the index finger, while the blunt edge of the blade rests against the palm. All fingers grasp the rod and help to press the stick against the cutting edge, and impart the upward, half-circular motion to the hand. See fig. 67.

So, too, when chipping a rod, not the handle, but the blade of the knife is held in the hand, the weight of the former giving momentum to the movements of the knife. See fig. 68.

Miscellaneous.

The most general mode of carrying an infant is to sit it astride on its parent's shoulder, the child holding on to the parent's head for support. On the march, a child often falls asleep in this position, and then the bearer may be seen holding one of his hands up as a cushion, upon which the child may rest its head.

Less frequently to be seen is the method usually adopted by whites, in which the child is held by both arms. The fact that the hands are thus preoccupied no doubt accounts to some extent for the limited use of this method, which is rarely seen further south. See fig. 69.

It has already been stated that infants are wrapped in bark of trees, and carried under the arms of their mothers.

Fig. 69.

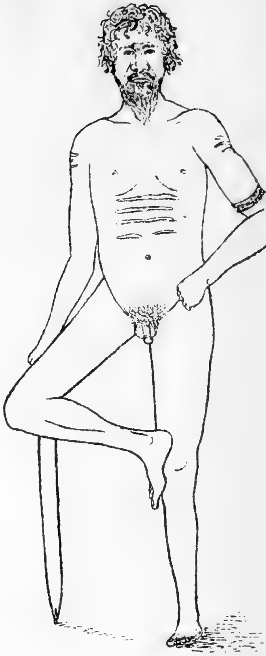

Fig. 70.

As among other primitive people, the strange habit of standing at ease on one foot prevails. One leg is bent, and its foot placed with its heel above the knee of the other, while the body is steadied by a stick or spear-thrower, held in the hand. See fig. 70. It may be mentioned that a man is rarely encountered without this implement. To be without it is not regarded as correct.

When a waterhole or billabong is reached, a decidedly animal-like method of drinking is often resorted to. The native wades into the water for some depth, then, placing his hands on the knees, he stoops down, places his mouth to the water, and drinks. See fig. 71. On a hot day, after he has quenched his thirst, he will usually cool his body by pouring water on to his head.

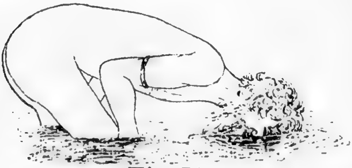

Fig. 71.

Rivers have frequently to be crossed by swimming, notwithstanding the numerous crocodiles that abound. Any personal belongings, that are not to be wetted, are wrapped in paper-bark, and the parcel held high and dry in the left hand, while the right arm propels. When long stretches of water have to be crossed, a log of wood is pushed along in front of the swimmer, and on it the belongings are carried.

With conditions so favourable, it is surprising that these coastal tribes have not developed greater power of navigation* and become capable of fashioning more seaworthy crafts than were observed; and, indeed, the tribes that have come into contact with Europeans and Asiatics have proved themselves to be well adapted for the art. But it is very doubtful whether the well-shaped dug-out canoes of the *Larrekiyas* near Port Darwin and those of the *Wogaits* beyond Point Charles are of native origin. Probably their manufacture is a product of the contact with Malays or some other race.

Macgillivray, in 1852, wrote† that "formerly bark canoes were in general use, but they are now completely superseded by others, hollowed out of the trunk of a tree, which they procure ready-made from the Malays, in exchange for tortoise-shell and in return for assistance in collecting trepang."

Both Flinders‡ and King§ have described bark canoes from the north coast of Australia.

Stokes relates¶ how Captain Wickham, when he discovered Bynoe Harbour, found, opposite the small projection of land he subsequently called Raft Point, "a raft carrying two women and several children, which was being towed by four or five men swimming alongside and supporting themselves by means of a log of wood across their chests." By buoying their body with the same means, several natives attempted to swim out, against a strong tide, to our lugger, the "Venture," when at anchor in Treachery Bay. The same has been recorded by His Excellency the Governor, Sir George R. Le Hunte,‖ from Treachery Bay, also. His Excellency points out

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* Professor Klaatsch has recorded the entire absence of the knowledge of navigation among the north-western tribes of Western Australia: Zeitschrift für Ethnologie, 1906, p. 794.

† Narrative of a Voyage of H.M.S. "Rattlesnake," 1852, vol. i., pp. 146 and 147.

‡ Voyage to Terra Australis, 1814, vol. ii., p. 198.

§ Survey of the Intertropical Coasts of Australia, 1827, vol. i., p. 90.

¶ Discoveries in Australia, vol. ii., p. 15.

‖ Rep. Visit to Northern Territory: Parl. Paper, No. 49, Adelaide, 1905, p. 4. See also P. P. King: Survey of the Intertropical Coasts of Australia, 1837, vol. i., p. 38.

that the Fijians in a similar way employ the trunks of banana-palms to assist them in their swimming.

Native Art.

Rock Drawings.—In 1841 Sir George Grey published* reproductions of drawings he found in sandstone caves on the Glenelg River in the north-west of Australia, and about these much discussion † has taken place as to whether they were the work of aborigines or not. The recent discovery, however, of similar designs, in the Kimberley district, by F. S. Brockman ‡ and party places the question beyond dispute. The drawings certainly demonstrate a greater development of talent than the average Australian blackfellow is usually credited with; and that this fact may be originally due to contact with shipwrecked sailors is supported, among others, by Dr. F. M. House§ and Professor Klaatsch.¶

As a very general remark, the drawings of the natives under consideration in the present paper, though of the same type as found throughout Australia, may be classed a step in advance of those of the central and southern tribes, so far as they have been placed on record. In the same way, the music and rhythm of the chants of the northern tribes may be said to be a little more pleasing to the ear than those of the Central Australian.

At Blunder Bay, on the Victoria River, east of Endeavour Hill, a low cave, or rock shelter, was discovered in the quartzite range on the river frontage. The numerous mortars fashioned on the slabs of rock for grinding ochre, utensils, soot-covered walls, and food remains showed that this cave has been, and is still, a frequent meeting-place of the blacks. The sides and roof of the cave were covered with many rock drawings, the most conspicuous of which are represented on pls. xi. and xii.

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* Journals of Two Expeditions of Discovery in North-West and Western Australia, London, 1841. Plates republished by T. Worsnop, Presidential Address, Section Ethn. and Anthrop., Austr. Association Adv. Science, vol. vi., 1895; and The Prehistoric Arts, Manufactures, Works, Weapons, etc., of the Aborigines of Australia, Adelaide, 1897.

† *Vide* Remarks on the Probable Origin and Antiquity of the Aboriginal Natives of New South Wales, by a Colonial Magistrate (Hall), 1846; Brough-Smyth: The Aborigines of Victoria, vol. i., 1878, p. 289; J. Matthew: The Australian Aborigines: Journ. Roy. Soc., N.S.W., 1889, vol. xxiii., p. 414.

‡ Rep. Expl. N.W. Kimberley, 1901, Perth: by authority, 1902.

§ Appendix C, of Rep. Expl. N.W. Kimberley, 1901.

¶ Zeitschrift für Ethnologie, 1906, p. 787.

Of this series, perhaps, the most striking is fig. 1 of pl. xi., which measures about twelve inches in height, and is painted in white pipeclay, such as is used for personal ornamentation at ceremonies. It represents a woman in a peculiar attitude, with her arms thrown apart, and one leg in a position strongly suggestive of the stamping movement of corrobborees. The arms and hands, too, look as if the artist had intended them to convey the same idea; for, as has been already alluded to on page 41, in the corrobboree dance of the gins, a long skein of vegetable strings is often held between the hands and worked backwards and forwards in a way which, from a distance, resembles the action of a fiddler's bow. No facial or other detailed features were discernible on the figure, and it is, therefore, doubtful whether the drawing is intended for a front or back view. The extraordinary large breasts suggest that it represents an adult. It will be noticed that three fingers only are given to each hand, while the toes are not differentiated.

Large drawings of crocodiles are plentiful. The best finished is shown in fig. 2 of pl. xi. It measures five feet three inches in length, and is drawn in red ochre, while its outline is defined with white pipeclay, made into a paste with water, and dabbed on with the finger. The head and tail are decidedly apparent, the latter tapering, the former being marked by a bulge on the upper surface to indicate the prominent frontal bone of those reptiles. The limbs are not divided into separate segments, but are shown as straight, outwardly directed members of unequal length, and terminating in each case in five claws, this number being correct for the fore, but one too many for the hind, limbs.

Fig. 3 of the same plate delineates the same animal in red ochre only, but it is more crudely drawn. The limbs are without claws, and resemble more the paddles of a turtle in shape.*

Several other forms of a similar type, with very slight modifications in design, and varying in length from three to five feet, are among the group. Figs. 1 and 2 of pl. xii. are identical with that last described, except that, in the latter, transverse bars have been drawn in yellow ochre, probably to represent the rows of horny scutes. The alternate placement, too, of the forelimbs of this design suggests motion.

Fig. 3 of pl. xii. represents two crocodiles, the smaller, done in yellow, being placed within the outline of the latter, which is in red.

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* A "saurian type" of figure in red ochre on granite has been recorded from Cloncurry, Queensland, by W. E. Roth: Ethnological Studies, p. 116, pl. xiv., fig. 280.

In fig. 4 of the same plate we have a sketch, three feet in length, in red, of what is no doubt intended for the head, body, and tail of a crocodile, with transverse bars across its length, as in fig. 2. The legs, however, are missing.

Fig. 5 of pl. xii., measuring two feet in length, is drawn in red ochre, and depicts the lower portion of a limb of a crocodile, which, if the number of claws is correctly drawn, is a hind leg.

Fig. 4 of pl. xi. is of doubtful nature. It is painted in yellow ochre, while at its lower extremity, a peculiar subsidiary design in red surrounds it. The red portion may have belonged to a previous, and, now, partly obliterated, drawing. I am unable to offer any suggestion as to its meaning. A *Larrekiya* youth traced its resemblance to a frog, and, no doubt, the general squat shape and broad, round end does suggest this view.

In fig. 6 of pl. xii. we may find an interest in spite of the design having become considerably obliterated through long exposure, from the fact that the radial markings of the little that remains remind one slightly of a feature in some of the paintings figured by Grey.* The only other explanation I can offer is the small ornament constructed of fur and beeswax, worn under the forehead-band of the men.

On the walls of this cave, also, are numerous reproductions of negative imprints of hands, made in the manner that has been previously recorded. The palm of the hand is held flat against the rock-surface, the mouth filled with a thin paste of pipeclay, or ochre, suspended in water, and these contents squirted around the hand. The result is that a patch of rock is stained red or white, as the case may be, except where it has been protected by the hand. In many instances the imprint is subsequently tinted with a different pigment, or in some cases a ground colour is given to the rock before the imprint is made.

Figs. 7, 8, and 9 of pl. xii. demonstrate these productions, which show that imprints are made both from the right and left hand.

Fig. 10—a long yellow, sinuous curve—may possibly have been suggested by the form of a serpent; but it is doubtful. As to the remaining figures on this plate, Nos. 11 and 12, I have no suggestion to offer.

I am indebted to Mr. W. Holtze for photographs of another group of rock-drawings, secured from the Katherine River. These are all drawn in pipeclay.

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* Journals of Two Expeditions of Discovery in North-West and Western Australia, London, 1841, vol. i.

A creditable design of a lizard is the best preserved of the group (pl. xiii.). It is well proportioned, and from the long, slender head and neck of the figure, one might safely refer it to the monitor (*Varanus* sp.), which is there plentiful and forms an object of their hunts. A decided differentiation between head, body, and tail has been attempted, the last-named tapering to a long, fine end. A long, bifurcated tongue is extruded, which is in conformity with a frequent habit of these animals. The left forelimb, only, possesses the correct number of claws.

On pl. xiv. are shown two drawings, which may probably be meant for representations of the archer fish (*Toxotes* sp.) that inhabits the waters of this region. This fish is noted for its habit of capturing insects resting on the leaves of water-plants by shooting a stream of water upon them from below. The general shape, position of the fins, straight antero-dorsal contour, and strong dorsal spines support the above inference. The lateral line in both drawings seems indicative of the row of dark circles usually ornamenting the local species; if that be so, the band is too central in the figure, and should be nearer the dorsal border.

The next, and different, variety of fish shown on plate xv. may be referred to a species of *Therapon*, on grounds of general similarity of shape. The species inhabiting the local waters is characterized by the short, square-cut tail, and the long, low, spiny, postero-dorsal fin that, it is clear, the figure means to represent. The sketch, at first sight, gives the impression that spines are distributed over the greater part of the body. The effect is very likely due to streaking of the pigment by the weather, rather than to design.

Drawings on Bark and Implements.—Reference has already been made to the emblems painted on the chests of messengers and visitors to another tribe, or of those who are returning after a long absence.

Somewhat allied to these are the pictorial representations of familiar objects upon implements and pieces of bark.

A very instructive series of pipeclay drawings on bark was obtained from the Katherine River, for the photographs of which I have again to thank Mr. W. Holtze.

The most true to nature, and perhaps the best-executed figure of the series is that of a kangaroo in profile (pl. xvi.). The sense of proportionate size of the various parts is not bad, as are also their details. From the attitude of the kangaroo it is probably intended to be dead; this is suggested mainly by the drawn-up tail and clutched fore-claws.

The figure on plate xvii. represents an emu. Its peculiar feature is the upturned position of the head, which is not very clearly delineated. The strong, muscular, upper portions of the legs have been rather exaggerated by the artist. The plump body of the bird is true to nature, and the correct number of toes has been assigned to each leg.

The following design (pl. xviii.), which is less favourably preserved, depicts either a bustard *(Eupodotis australis)* or a crane, in a rather unnatural attitude, which also may be that of a dead bird. The long, thin neck is more suggestive of a crane than a bustard. A portion of another bird is also indistinctly visible.

Fig. 72.

A group of drawings on a single piece of bark was found by Mr. P. Foelsche at Port Essington, and is represented in fig. 72.

One of the figures repeats the salient features of the kangaroo already described.

The figure on the right-hand side illustrates the method of hunting the turtle by harpooning it from the bow of a canoe, the rope that is attached to the harpoon being plainly visible and connected with the canoe.

The figure of a human being adjacent to this group may or may not belong to the former. It is of a character similar to the drawing described from Blunder Bay; while the long breasts suggest a woman, the opposite sex is also clearly indicated in the sketch. The hands and feet are crudely represented, the latter being abnormally large.

The largest figure, on the left hand, is that of a boat with a mast and tackle, and three men aboard. These are not nude, but clothed, and consequently not intended to be aborigines. The boat, which is quite different from the native canoes, may be intended for one of the

Malay proas that have been in the habit of visiting the north coast of Australia for many years past.*

A photograph of similar bark drawings said to come from east of Port Darwin (possibly the Roper River), is in the local museum at Palmerston. By kind permission of the Curator, Mr. N. Holtze, I have made the tracings reproduced on pl. xix. Practically the same objects as those figured in the preceding plates are represented.

The kangaroos of figs. 1 and 2 are not unshapely, and the attempt to reproduce a bird of prey perched upon the one in the former figure is unusual. Wickham, in his "Notes on Depuch Island,† figures a group in which a similar occurrence is depicted. In the explanation he writes that it "appears to be a bird of prey having seized upon a kangaroo-rat."

The remaining drawings of fig. 2 are, no doubt, intended to represent turtles.

Figs. 3, 4, and 5 are well-finished designs of fish of several species.

Fig. 6 clearly represents a saw-fish *(Pristis* sp.); fig. 7, a group of dugongs *(Halicore australis)*: fig. 8, two turtles; and fig. 9, a crocodile. Judging from the position of the eyes, the last-named figure is intended to represent the dorsal surface of the animal, but it will be seen that the artist also clearly drew the anus.

Fig. 10 is an unusually bold design of a snake.

In conclusion, I have to acknowledge my indebtedness to Messrs. P. Foelsche and N. and W. Holtze for the instructive series of photographs, and to Professor E. C. Stirling, C.M.G., F.R.S., for kind assistance with my manuscript.

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* *Cf.* Flinders: Voyage to Terra Australis, 1814, vol. ii., p. 228.

† Journ. Roy. Geogr. Soc., Lond., vol. xii., 1842, p. 79, fig. 71. Stokes subsequently published it in his "Discoveries in Australia," 1846, vol. ii.; and more recently Worsnop: Pres. Address, Sec. Ethnology and Anthropology, Austr. Assoc. Adv. Science, vol. v., 1895, 1, *et op. cit.*

COMPARATIVE VOCABULARIES* OF THE LARREKIYA, WOGAIT, SHERAIT, AND BERRINGIN TRIBES.

ENGLISH.	LARREKIYA.	WOGAIT.	SHERAIT.	BERRINGIN.
boy	ngim	bambad	mäunmin	yerra
girl	banngelö	midalöng	darawurru	tchiparre
old man	lörropa	ngamuyuk	ponduburruk	börlö
old woman	gumul	ngabali	mangut	dalyuk
head	malumma	büja	bondu	biya
nose	gwüngwa	wija	inun	yin
ear	banarre	bibörre	monijaul	jöngi
tongue	kwiamellö	ngadal	dang	önngaba
teeth	dünnburrogi	didö	dirr	ngal
breasts	gwimingoppa	wing	wiing	yingi
back	gumilangwa	bäbbera	dan	deddi
hand	gäuuarrewa	ngallö	ngenyulk	nurgur
shoulder	darramindil	delmä	mendum	minmä
testes	gwiungwa	bör	pinguin	morro
foot	gwielgwa	jut	mäl	gumbo
anus	gumolwa	möung	böp	mörrö
water	karawa	wiuk	wak	ouda
fire	gwingwa	win	junge	
smoke	gwaiyingwa	wingal	wendö	dumor
wind	gororua	marröuk	oruk	marrouk
star	mamilemma	murre	ngärwa	bundenyiba
night	damungwa	moradja	bäu yadu	mäuperl
emu	dangorra	ngäurun	ngäurin	allungarinya
crocodile	ngangalabba	wilärre	yingu	warambenn
one	galluwuk	nganjit	yawonyukka	nganji
two	gallitchillik	barkardömma-lang	wärrenukka	meidya
three	gallitchillik galluwuk	barkarda nganjit	wöritdawan	meida nganji
come here	ngallak	gau-a	wai yá	gau

* Compare further :—J. L. Stokes: "Discoveries in Australia," 1846, vol. ii., p. 23; T. A. Parkhouse: Trans. Roy. Soc. S.A., 1895, vol. xix., pt. I.; E. M. Curr: "The Australian Race," 1886, vol. i., p. 258 (No. 1, Port Darwin, by Paul Foelsche).

EXPLANATION OF PLATES I. TO XIX.

Plate I.

Larrekiya man, about 28 years of age, with body scars exceptionally well defined, wearing forehead band of kangaroo teeth.

Plate II.

Larrekiya man, about 35 years of age, wearing plume of cockatoo feathers, forehead band, nose-stick, necklace made of threaded segments of grass-stems, armlets, and broad coiled belt of stringybark; the circular scars produced by the firestick along the upper arm and diagonally across the chest are also visible.

Plate III.

Larrekiya woman, about 30 years of age, showing scars made on her back during the mourning ceremony at the death of her husband.

Plate IV.

Kunandra woman, about 23 years of age.

Plate V.

Tree burial. Lifting the corpse to the platform of boughs constructed in the forks of trees.

Plate VI.

Tree grave, near Knuckey's Lagoon.

Plate VII.

Woman in mourning, showing gashed scalp with ashes rubbed in. She is in the act of collecting wood for the camp fire, and is wearing a white forehead band.

Plate VIII.

Natives driving fish, to be trapped in shallow water, Katherine River.

Plate IX.

Native hut.

Plate X.

Fig. 1.—Implements for making fire by the "sawing process."
Fig. 2.—Native making fire by "sawing process."

Plate XI.

Rock drawings, Blunder Bay, Victoria River.

Plate XII.

Rock drawings, Blunder Bay, Victoria River.

Plate XIII.

Rock drawing, monitor, Katherine River.

Plate XIV.

Rock drawing, fish (*Toxotes* sp.), Katherine River.

Plate XV.

Rock drawing, fish (*Therapon* sp.), Katherine River.

Plate XVI.

Bark drawing, kangaroo, Katherine River.

Plate XVII.

Bark drawing, emu, Katherine River.

Plate XVIII.

Bark drawing, bustard, Katherine River.

Plate XIX.

Bark drawings, east of Port Darwin.

A New Microtis.

By R. S. Rogers, M.A., M.D.

[Read November 6, 1906.]

Plate XX., Fig. 1.

Although the genus *Microtis* is widely distributed throughout Australia, it is represented by only a few species. In this and the eastern States three have been recorded, *viz.*, *M. porrifolia*, *M. parviflora*, and *M. atrata*. Of these, the second has been regarded by Baron von Müeller and others merely as a variety of the first. *M. porrifolia* is found in all the States and in New Zealand.

M. parviflora is a rarer form, but occurs in all the eastern States, though not in South Australia.

Both these species were discovered by Robert Brown in 1802.

M. atrata is a minute species, rather sparsely distributed in this State and in Victoria. It was named by Lindley in 1839.

The discovery of a totally new species in this State is therefore of more than usual interest. I found this plant on November 2, growing in a swamp at Myponga, a place situated about thirty-seven miles south of Adelaide. It was not rare in this locality, and I was able to collect a large number of specimens without difficulty.

Because of its round tongue, I have named it "*Microtis orbicularis.*"

Microtis orbicularis, *nov. sp.*

The plant varies from about 7 to 12 inches in height.

Its *stem* is rather slender, with a marked and characteristic angulation, or shoulder, where it emerges from the sheath. This divergence from the vertical often makes an angle of 45 degrees, and is present in over a hundred specimens which I have preserved. There seems to be a marked uniformity, too, in the distance between the fistula in the leaf and the beginning of the inflorescence. This is about half-an-inch.

The *leaf* rarely reaches more than halfway up the spike

The *spike* varies in my specimens from $\frac{3}{4}$ in. to $3\frac{1}{4}$ in. It presents a generally flatter appearance than in "*M. porrifolia.*" and the flowers are not so crowded as in that species, varying from 5 in the shortest specimens to 30 in the longest.

The *flowers* are minute, sessile, and subtended by a wide, obtuse, clasping bract, which covers in the greater portion of the antero-lateral aspect of the ovary. The dorsal *sepal* is obtuse and galeate; the lateral ones are flat and linear, lying behind the labellum, which completely hides them in a front view of the flower. *Lateral petals* are transverse, fairly wide, shorter than the labellum, and slightly re-curved.

The *labellum* is orbicular, with entire margin. There is no appearance of crenulation in fresh specimens. Upper surface is somewhat concave.

The *column* is very minute, with distinct linear auricles. The rostellum is protuberant, and shows as a dark dot below the galea of the dorsal sepal. The anther-case is galeate and bi-loculate, the caudicle is long.

Two varieties were observed, one green, and the other a reddish-brown, the colouration apparently not depending on the age of the plant.

It will be seen that it differs from all Australian species of *Microtis* in the shape of the labellum; and from all but *atrata* and *pulchella* in the absence of recurved lateral sepals. From *atrata*, which is the most minute species recorded, it further differs in point of size, colour (the colour of *atrata* being very constant in this State—a yellowish-green), and in the fact that the lateral sepals are not hidden by the labellum in this pigmy form. *M. pulchella* has broad lateral sepals, and a contraction in the middle of its oblong labellum, which readily distinguish it from the new species.

On account of the inadequate descriptions of *M. parviflora*, this is indeed the only form with which it is likely to be confused. Here, however, the lateral sepals are recurved and not hidden by the labellum; the labellum is rectangular, generally with crenulate margins; the flowers are not sessile, and the large clasping bract is absent. *M. orbicularis* further differs from this, and, indeed, all eastern species, in the *marked angulation* in the upper part of the stem.

Description of Plate XX., Fig. 1.

A. Front view, showing:—*d.s.*, dorsal sepal; *l.p.*, lateral petals; *l.*, labellum; *b.*, bract (shown rather large in this figure); *o.*, ovary.

B. Side view, showing, in addition to the above:—*l.s.*, lateral sepals (hidden by labellum in *A*).

THE PHOSPHATE MINERALS FROM ELDER ROCK.

By D. MAWSON, B.E., B.Sc., AND W. T. COOKE, D.Sc.

[Read November 6, 1906.]

PLATE XX., FIG. 2.

CONTENTS.

I. INTRODUCTION.

Elder Rock is situated ten miles south-east of Paratoo Railway Siding, and, roughly, 160 miles north of Adelaide, on the Broken Hill line.

The occurrence of nitrogenous phosphatic rock from this locality was announced by Mr. J. G. O. Tepper at the last November meeting of this Society. Specimens of a red, porous, ochreous rock, said to contain quantities of nitrogen, ammonia, and phosphoric acid, were exhibited.

Shortly afterwards several smaller occurrences were reported, distributed at intervals in an east-north-easterly direction from the original discovery.

The "Elder Rock Nitrates Development Company" proceeded to exploit the deposit, but soon proved beyond doubt its limited nature, and ceased operations.

II. LOCAL GEOLOGICAL FEATURES.

The route from Paratoo Railway Siding lies across two ranges of hills with flat land intervening. The first of these is met one mile out, where the road follows a deeply eroded creek-bed, cutting across the strike of the range, and exposing strata of a familiar character. In conversation with Mr. W. Howchin, who had already visited the locality, these rocks were described as belonging to the middle division of the South Australian Cambrian series; according to the same authority they are described as "corresponding to the Tapley's Hill slates and impure siliceous limestones and true limestones of the Brighton series, with a general strike to the north-east and a dip south-east at about 35°." The strata flatten out further to the south-east, where an almost horizontal impure limestone is conspicuous, leading up to the Grampus Range, which latter is crossed within a mile or two of the fertilizer claims.

The Grampus Range is a jagged tent-hill ridge of quartzite, flanked on either side by softer and more readily denuding slaty strata. The main quartzite bed is about 25 ft. thick (striking about N. 74° E., and dipping 69° to the north). It can be traced for some fifteen miles on either side boldly outcropping across the plains in an almost linear direction. At the trigonometrical station on top of Grampus Hill, a remarkable view is unfolded. From that high point the dreary prospect of barren saltbush plains is relieved, and the effect of arid weathering on the rocky pedestal itself correspondingly accentuated.

On the south side of Grampus Creek is a broad belt of limestone, apparently part of the same series. At several places examined this limestone is much metamorphosed by silication, and is intersected by manganiferous and micaceous-iron lode formations. It is in close association with this belt that the hardened breccia, forming Elder Rock and the other outcrops bearing the fertilizer further to the north-east, occurs.

Owing to its soft character also, denudation has here progressed rapidly and fostered the main drainage lines of the district, developing Grampus Creek and a wide belt of low—at one time, when the rainfall was heavier, evidently swampy—land in its course.

III. Elder Rock.

Elder Rock rises from this low-lying level area with almost shear sides 30 ft. in height (see pl. xx., fig. 2). When viewed from a distance it reminds one of a ruined fortress. Its horizontal dimensions are, roughly, 25 yards by 30 yards. A coarse breccia composes a large part of its mass, and is usually dark-coloured, due to the presence of much iron, as magnetite and hæmatite; other parts are formed of ferruginous quartzite. Case-hardening, due to arid conditions, has produced a superficial weather-resisting shell with much softer rock a few feet within.

On top, in depressed areas, several inches thick of hard yellowish phosphate was discovered. It is likely that at one time this material was more abundant, as traces of it appear over all the top of the rock, and at several places down the sides where showers of rain have transported it in solution. All cracks and fissures were found occupied by the same substance.

On the west side an adit has been driven in towards the centre of the rock 30 ft.; and in the floor of a chamber, excavated 10 ft. in from the mouth, a winze has been sunk a distance of 16 ft., and again from the bottom of this a drive put in about 18 ft. to the west.

Near the mouth of the adit, some 30 ft. below the top of the rock, a fissure was observed, lined with a phosphate similar to that on top of the rock. Within the rock, in chimney-like pipes, a foot or more in diameter, and closed at either end, a dark chocolate-coloured substance was observed in crustified layers; this substance chiefly consists of ferric oxide, with abundance of ammonia and nitrate, and a small quantity of phosphate. In the vicinity of these chimneys the whole body of the rock, which is a porous, ferruginous sandstone, is charged with these fertilizers. More remote from such channels, the valuable contents diminish in amount until traces only can be detected in the rock. Nitrogenous rock was met in the lower drive, indicating a considerable vertical extension of impregnation.

IV. Origin of the Epigenetic Fertilizer Contents.

A careful consideration of the nature of the occurrence leaves no other conceivable explanation of genesis than that this peculiar combination of substances originated from a guano deposit. We surmise that a considerable accumulation of bird-droppings have, in not remote times, been deposited on Elder Rock, and since largely removed by rain water. As already remarked, there is evidence of one-time swampy conditions in the vicinity, along the course of Grampus Creek, favouring the possibility of abundant bird life. In any case, its prominence determines it a natural resting-place for flying creatures, and so present conditions, even, are favourable to accumulations of bird guano. Confirmation of this latter argument, as well as the bird-derived origin of the phosphate, is had in a similar, though smaller, deposit, encrusting the summit of a lofty quartzite peak, about one mile west of the Ajax Mine, near Beltana. At this latter locality, when visited last January, recent bird-droppings were found passing into material identical with that at Elder Rock; moreover, a large eagle took flight from the spot as we approached.

The residuary yellow phosphate on top of Elder Rock has resulted by various chemical changes effected in the guano; the more soluble compounds having passed away in solution and the comparatively insoluble iron and aluminium phosphates remaining. This latter owes much, in a genetic sense, to arid climatic conditions. Though not a simple mineral compound, we will, for the sake of brevity, refer to this residuary phosphate as *paratooite.* No similar substance has, to our knowledge, been previously recorded from South Australia, though it is likely distributed in scattered occurrences where the physiographic conditions are similar.

The *paratooite* from near Beltana encrusts quartzite and contains only small quantities of iron. That from Elder Rock contains abundance of iron, which has evidently been derived by chemical changes from the underlying ferruginous breccia.

Part of the soluble salts in the guano has been lost by torrential rains; much appears to have sunk deep into the porous rock below, and is specially concentrated, as already remarked, on the walls of the crevices and chimneys.

Samples of rock taken at intervals in depth below the *paratooite* showed, when tested qualitatively, a regular decrease in phosphate contents and gradually increasing ammonia and nitrate. Three chief zones were recognized: At the surface, *paratooite* containing no appreciable amount of ammonia or nitrate; below, the rock was found charged with phosphates and ammonia, and but mere traces of nitrate; at greater depths, for example, in the lower drive, 46 ft. below the top of the rock, ammonia and nitrate were found in the rock, and only traces of phosphate.

The ammonia content of the intermediate zone is regarded as existing chiefly in the form of ammonium phosphate (stercorite molecule). In the lowest zone it is likely combined as ammonium nitrate. The possibility of the presence of more than inappreciable amounts of the nitrates of sodium and potassium is eliminated by the absence of these elements in notable quantities, as proved by an analysis of a bulk sample of the rock. The better quality of this impregnated rock bulked about 5 per cent. of ammonium nitrate.

The chimneys met with in excavating operations had no connection with the exterior, and as no trace of bat guano or bones was found, the main responsibility is thought to lie with birds.

V. Chemical Composition and Physical Characters of Paratooite.

The substances examined are mixtures of several phosphates, with much mechanically-admixed sandy matter. A petrological examination revealed two main distinct mineral forms in the *paratooite,* readily distinguished by being isotropic and anisotropic respectively.

Two samples were selected for analysis. One of these chiefly composed of the isotropic variety, the other mainly anisotropic phosphate. The former of these, a light yellow encrusting form, returned the following composition:—

	Bulk Analysis.	Re-calculated (less impurity).
SiO_2 (sand impurity) ...	17·30	—
Al_2O_3	17·12	20·70
Fe_2O_3	6·78	8·20
CaO	2·06	2·49
MgO	0·92	1·11
P_2O_5	35·22	42·59
H_2O (loss at 120°)... ...	16·94	20·49
Ignition	2·65	3·20
By diff., chiefly Alkalies ...	1·01	1·22
	100·00	100·00

The second column is a readjusted statement of the analysis after subtracting the silica present as sandy impurity.

On calculation, this result is found not to represent any definite molecular combination, nor was it expected that any such could be deduced after the foregoing petrological observations. It is evidently a mixture of several substances, whose exact nature cannot be determined.

The second variety occurs in depressions on the surface of the rock, and masses 20 cms. thick were obtained. It is found as an aggregation of tiny globules about 2 mms. diameter, appearing yellowish-brown on broken surfaces. Fracture, smooth. Hardness, 5·5. Lustre, dull. In sections under the microscope the spheres are seen to be composed of aggregated doubly-refracting matter of a yellowish-brown colour. An indistinct radial arrangement is observable especially towards the outer margin, where it is also usually of a somewhat lighter tint. A little foreign sandy matter is present. Double refraction, probably about 0·023. Refractive index, much above quartz.

	Bulk Analysis.	Re-calculated (less impurity).
SiO_2 (sand as impurity) ...	36·72	—
Al_2O_3	7·06	11·19
Fe_2O_3	24·25	38·43
CaO	2·32	3·68
P_2O_5	17·37	27·53
H_2O (loss at 120°)... ...	10·36	16·41
Ignition	1·74	2·76
	99·82	100·00

The second column is a re-statement of the analysis, after deducting 36·72 per cent. of sand.

Again, in this case, also, no definite molecular composition meeting both the petrological and chemical requirements can be assigned.

The salient fact demonstrated by the analyses is that, in the case of the first mineral, the light yellow encrusting isotropic phosphate is a mineral of the evansite type; the other variety, found in globular aggregates, and appearing anisotropic, is distinctly of the beraunite type, perhaps closely related to globosite.

VI. Summary.

1. Elder Rock is a prominent, abrupt mass, standing in a level plain in the arid northern districts of South Australia.

2. A hard yellow phosphate encrusting the top of the rock is the remnant and more insoluble part of a larger deposit of guano, chiefly bird-derived.

3. The soluble salts of the guano have, to some extent, saturated the rock for a depth below; in a favourable spot this impregnation has been effective for at least 46 feet in the vertical. These compounds are chiefly nitrates of ammonia, with some fixed alkali and phosphate. The more soluble compounds have percolated to greater depths.

4. The hard yellow phosphate on top of the rock is a mixture of minerals, chiefly iron and aluminium phosphates, and has no definite composition; it is, however, here referred to as *paratooite*. Two widely-divergent types are described, the commoner near to *evansite*, and a scarcer globular phosphate related to *beraunite*.

5. *Paratooite* probably has a wide distribution, as small scattered occurrences in the arid northern parts of South Australia.

So far as we are aware, no similar phosphate has ever previously been described from Australia.

DESCRIPTION OF PLATE XX., FIGURE 2.

Elder Rock, seen from the east; barren saltbush plains in the foreground.

Geological Features of Part of Eyre Peninsula.

By D. Mawson, B.E., B.Sc.

[Read November 6, 1906.]

Contents.

I. Introduction.

The following remarks on the geological features of southern Eyre Peninsula are but cursory, the data having been collected during several short visits only. The publication of such hasty observations, however, seems amply justified, as no geological reports,* so far as I can ascertain have yet been furnished on this area.

The field examination was conducted from two centres, Port Lincoln and Tumby Bay.

II. Physiography.

The topographical features in the neighbourhood of Port Lincoln tend to a north-and-south development, conforming to the trend of the strata. Hilly country, of varying width, skirts the Gulf shores from Port Lincoln to Lipson's Cove on the north, a distance of forty miles; at some distance to the south, also, precipitous sea cliffs are developed.

It is the Port Lincoln to Lipson Cove belt that has come under immediate observation. The hills in this stretch of country reach a fairly uniform height of 800 to 1,000 feet. Beyond the coast range, two miles west of Port Lincoln, the country falls steeply into a low swampy area, running parallel with the high ground. Pinch Swamp occupies the most depressed portion of this belt, which extends towards the Southern Ocean.

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* A few odd statements referring to this region may be culled from the reports of the Mines Department of South Australia, but they do not pretend to geological detail.

West, again, level, seemingly barren country, supporting sheaoak, yacca, and heath, forms a peneplain, elevated several hundred feet, and extending far towards Coffin Bay. In that direction, the Marble Ranges stand out in the distance as solitary imposing ridges; only minor undulations modify the intervening expanse.

On the Gulf side, commencing some two miles north of Port Lincoln, a narrow aggraded peneplain extends northwards at an elevation of some 20 feet above the sea. As it proceeds up the coast, it broadens out considerably to a maximum width of 10 miles at Red Cliff, above Louth Bay. It also varies considerably in elevation. In part, especially where it is broadest, this surface owes its planation to degradation. Some of the cliff exposures in the aggraded areas show mottled clay-beds, quite similar to those classed as freshwater Miocene in the vicinity of Adelaide. This stage of peneplanation is therefore to be correlated with the mid-level plane so strongly marked in the hills near Adelaide.

The uniformly level surfaces of Tumby Island and the islands of the Banks Group in Spencer Gulf appear to be topographically continuous with this peneplain, and indicate a former continuity in that direction. Inland from Tumby Bay, where the hills commence, traces of a peneplain can be noted standing at higher elevations, abruptly terminated on the eastern side by the lower coast plains. West, for about 15 miles, this high-level planation extends, though much warped and dislocated.

III. Geological Features.

(a) Recent.—A soft recent limestone, a few inches to many feet in thickness, occurs as a covering on the older rocks over a wide area in the Port Lincoln district; especially is this formation more abundant towards the south. It is found thickest on lower ground, but patches occur high up on the flanks of Winter's Hill, elevated at least 600 feet. In its unaltered state it is composed of foraminiferal tests and comminuted shell fragments; at other times it is formed of an exceedingly fine calcareous powder, resembling chalk, though sufficiently hard to be of some use as a building stone. Travertinization has developed an upper harder crust, as much as several inches in thickness, and in places downward percolating waters have formed travertine tubes, with a general megascopic appearance, not unlike some species of Lithothamnion.

A similar limestone formation has been described by various authors from Southern Yorke Peninsula and other parts of the State. According to Mr. Howchin, who is well acquainted with this material, it is of wind-blown origin, and of recent age.

(b) Miocene (?).—The more conspicuous peneplains described are probably of Micocene age, as the aggraded areas are formed of fresh-water sediments, similar to those better known in the vicinity of Adelaide. Pebble beds are frequently interbedded with the clays, indicating proximity of origin. On account of their soft nature these beds are much cut into by the erosive action of the sea.

(c) The Pre-Cambrian Complex.—With the exception of the minor developments already described, all the rock exposures known to us are probably of Pre-Cambrian age. The data leading to this conclusion rests on petrological and lithological grounds, as palæontological evidence, except for negative information, is entirely wanting. The resemblance which the Port Lincoln series of rocks bears to that classed as Pre-Cambrian in Southern Yorke Peninsula is the main support for this decision. In addition, the absence of any beds of the recognized Cambrian series of the Mount Lofty Ranges, and the extreme metamorphism displayed, aids in this same conclusion.

At Port Lincoln the strata trend uniformly in an almost north and south direction, with a tendency to east of north.

At Tumby Bay the rocks are chiefly meta-sedimentary, and preserve a uniform N. 55° E. direction. There is a distinct possibility, therefore, that these are two separate series, the Port Lincoln rock being referable to an older period. A careful survey of the intervening country will alone settle this point.

At Port Lincoln a great series of schistose rocks, chiefly gneisses, is well exposed at Point Kirton, where quarrying operations are in progress for the railway jetty under construction. Here pure white, coarse-grained quartz-felspar gneiss passes into a typical augen variety, with biotite developed along the lines of crush. In places it is intricately folded. Dark-grey basic bands, of fine-grained amphibole granulite, sometimes many feet in thickness, run parallel with the gneiss, sometimes isolated in the midst of the latter. Occasional coarse acid pegmatite veins can be traced passing obliquely across the foliation. One of the most notable features in the vicinity is the occurrence of a biotite-bearing pilotaxitic dolerite dyke, about 30 feet wide, running with the series. For the most part this rock is entirely fresh, though along certain cracks uralitization was noted to have commenced. No clue to its age is forthcoming. It cannot be very ancient, certainly not comparable in this respect with the intruded rocks.

Westward of the township, further developments of a similar gneiss, with occasional patches of true granite outcrop at intervals along the old Lake Wangary Road to its summit; at this point an interesting series of rocks, with features more strongly suggestive of a meta-sedimentary origin than any previously noted, is met with. Fine grained felspar-actinolite, mica-felspar-quartz, and epidote-quartz schists alternate in narrow bands with each other. Amongst these is a beautiful actinolite-felspar-quartz schist, in which the actinolite has taken up a radial arrangement identical in appearance with specimens collected at Rocky Gully, near Murray Bridge. Further gneissic rocks, with structures strongly suggestive of a sedimentary origin, outcrop on the west side of Winter Hill. An isolated bed of fine-grained quartz-felspar schist was noted outcropping on the far side of Pinch Swamp.

At Tumby Bay the most attractive feature of the old rocks is a wonderful development of marble in all stages of silication. This belt of rock, though highly metamorphosed, is readily distinguished, and can be followed from near Lipson Cove, in a south-west direction, past the Port Lincoln Copper Mine, and no doubt extends far in the direction of the Marble Range. Magnesian minerals are largely developed in this belt, serpentine, asbestic, talc, and magnesite being fairly abundant. In places, silication has advanced so far as to produce a nearly pure wollastonite rock.

Bordering on this metamorphic-marble belt are thick strata of highly crushed rock, in which are abundant pseudo pebbles of granulated quartz and felspar; these are embedded in a schist base of fine particles of the same materials, with abundant highly pleochroic (light yellow to deep red) mica and garnets. Some beds in this zone are so exclusively composed of garnets as to assume the character of garnet rock; specially good examples of such are met with a few yards west of both the Port Lincoln Copper Lode and the Burrawing Lode.

At the Port Lincoln Mine, which is on the south-east side of the marble belt, the strata dips steeply to the north-west, whereas an opposite dip was recorded further to the north-west. This fact, taken in conjunction with a sharp syncline observed in certain overlying quartz-felspar schists, possibly indicates a synclinal trough. On either side of this belt, trending in a parallel direction, are rocks of a more igneous character.

Southward, towards Yalluna, is a broad series of gneissic rocks, very beautifully lined, darker areas composed of granular orthoclase, quartz, magnetite and much sea-green amphibole, alternating with colourless bands of quartz and felspar, the latter mineral usually arranged as corroded ovoid units. Thus is formed a laminated grey and white rock, and various stages are observable, in which either of the bands become predominantly developed. Though meta-igneous in general appearance, there are grounds for ascribing a possible meta-sedimentary origin for at least a portion of this series. As far as a mile across the strike beyond this are garnet-mica-quartz-felspar schists passing further south into grey gneiss, composed of granulated quartz and felspar, with a little biotite only. Coarse pegmatite dykes are abundant, often carrying tourmaline and hæmatite.

North-west of the metamorphosed marble belt, in the vicinity of Wadella Springs, much pegmatitic tourmaline-bearing granite, forms conspicuous dykes amongst schists and granulites. Eight miles further west, near Chinmina and Cockaleechie, outcrops of quartz-felspar-schist and gneissic granite types were observed.

IV. Economic Mineral Resources.

The character of the country, and the prospects so far brought to light, augur much for the possibilities of economic mining in Eyre Peninsula.

Copper will, no doubt, always stand far ahead of other mineral products. It is interesting to note that about one-sixth the world's production of this metal is won in the Lake Superior regions from rocks of approximately the same age as the Tumby Bay series.

The main lode of the Port Lincoln Copper Mine is the type that should be further prospected for along the syncline of metamorphosed marble. The ore in this formation is a good quality copper pyrites, introduced as a metasomatic replacement of the limestone, which, in places, is mineralized for a width of 20 feet along the strike from the underlay side. A quantity of quartz occurs with the ore. Iron pyrites is developed in slaty bands.

South of the main ore-belt copper-bearing fissure veins cross the schists, and, though always narrow and irregular, have yielded a quantity of ore.

Very little mining has been done for other metalliferous minerals.

Much *iron ore*, chiefly as a surface concentration from iron-bearing schists, is scattered through the district generally, forming prominent hills, a usual feature in the weathering of archæan schists. Such ores are both hæmatite and limonite, and often contain a notable proportion of manganese; occasionally, the percentage of this latter element is so preponderant as to constitute a manganese ore. These ironstone outcrops may, in some cases, harbour copper ore at a depth; especially is this likely in proximity to the marble belt.

Graphite.—A belt of gritty and argillaceous meta-sedimentary strata, several hundred yards in width, and situated about a mile west of the Port Lincoln Mine, is charged with graphite to such an extent as to offer possibilities for development. Other outcrops of graphite-bearing rocks are reported from the district.

Clay.—A wonderful development of remarkably pure kaolin occurs about 15 miles west of Tumby Bay, between Chinmina Creek and Cockaleechie Creek.

Felspar.—A massive pegmatite dyke, with large blocks of orthoclase felspar, cuts the marble series in the Mine Creek, near the Port Lincoln Mine. This is an example of many similar felspar-bearing formations of economic value developed in the district.

Magnesium Minerals.—Chrysotile (asbestic), talc, and magnesite are abundantly developed in the marble belt, and cannot long remain unexploited.

The Wadella Springs and Associated Bog-Iron Ore Deposit.

By D. Mawson, B.E., B.Sc.

[Read November 6, 1906.]

The Wadella Springs are located on Eyre Peninsula, about seven miles west-north-west of Tumby Bay. Their present aspect is more of the nature of a soakage, water oozing to the surface over an area several hundred yards in length. Coarse reedy grass grows along the creek-bed, draining the boggy ground, and directs attention to the presence of moisture.

The rocks in the vicinity are highly metamorphic schists and gneisses, regarded as of Pre-Cambrian age, intruded by numerous pegmatitic granite dykes. In close proximity, also, is a large body of iron ore, forming a flattish-topped knoll, whose upper surface is elevated about 700 feet above sea level. The creek draining the springs has cut away the southern end of the deposit in its work of channel development. The limonite composing the ore-body is exceptionally pure, and different in character from that usually found composing ironstone outcrops in South Australia. A syndicate that one time held the property sank several shafts, and proved the body to be comparatively shallow. The excavations also showed it to be composed in the main of large masses of solid limonite, breaking with a varnish-like fracture, set in a matrix of an impure earthy variety; this latter increases in relative bulk towards the base of the deposit, depreciating its value.

An approximate estimate of the thickness of the mass is some 30 feet towards the centre, gradually decreasing in saucer fashion towards the margin. The superficial area is, roughly, a couple of acres.

The springs are situated about 50 feet below the top of this ironstone rise, on its western and southern borders. When making geological investigations in the district, my interest was enlisted by Mr. G. Carr, the farmer in possession. This gentleman assured me that he had a petroleum spring on his property. He further described it as not any ordinary type, but one which is in the habit of changing its affluent liquid to milk in wet weather, and, at all times, having a powerful corrosive action on rock fragments placed in its waters. With this air of mystery, no further inducement was necessary for me to arrange a visit to the enchanted spot. At that time the weather was dry, and the spring water only gently oozed from the ground, trickling away with an irridescent oil-like scum. Tiny colourless crystals were observed deposited on sticks and other rubbish in its course. These latter proved to be gypsum; the irridescent scum, a hydrated oxide of iron. The water was found to be charged with sulphates, chiefly of calcium.

About six weeks later, it being wet weather, a second visit was made. The waters were, on this occasion, observed flowing away white and milky. The milk-like appearance was found to be due to an abundant fine white precipitate of calcium sulphate.

Putting these observed facts together, it is evident that the Wadella Springs are deep-seated in their origin, and mineralized with abundant sulphate contents. Iron sulphate is a notable constituent, no doubt derived from the oxydation of pyritous bodies below. The iron in such chalybeate waters is readily thrown out as hydrated oxide by calcium carbonate, or organically derived substances, such as ammonium humate, occurring in surface waters. Under ordinary conditions the process is slow, and the calcium sulphate formed crystallizes out as gypsum; in wet weather, when surface water, saturated with calcium carbonate, flowing over the ground, meets the spring water, an abundant, fine white precipitate of calcium sulphate (gypsum) takes place, producing the milky appearance.

It is further evident that the bog-iron ore deposit in proximity has originated from these spring waters. The fact that the present outlet of the springs is about 50 feet below the top of the ironstone deposit indicates the lapse of a considerable period of time since the maximum phase of activity when notable ore-deposition was in progress. The ore body is very similar to the scattered limonite deposits in the Mittagong district of New South Wales.

The Wadella Springs are of further interest, as affording an illustration of how gypsum deposits may originate, thereby aiding to explain the vast accumulations and widespread distribution of the latter mineral in self-contained inland drainage basins of South Australia, where abundant calcareous and pyritic schists are exposed for denudation.

A Comparison of Some Forms of Electric Radiation.

By W. H. Bragg, M.A., F.R.S., Elder Professor of Mathematics and Physics, the University of Adelaide.

[Read May 7, 1907.]

We are now aware of the existence of a number of different types of radiation, each of which is able to ionise a gas, to act on a photographic plate, and to excite phosphorescence in certain materials. Of these the α and canal rays consist of positively charged particles of atomic magnitude; the cathode and β rays are negative rays, and consist of electrons; the X and γ rays are supposed to be ether pulses; and ultraviolet light consists of short ether waves. The δ rays stand by themselves, for, though they consist of negative electrons like the cathode and β rays, they have so small a velocity that they possess no appreciable ionising powers

The present paper contains an attempt to find whether there is anything to be learnt from a comparison of the properties of the various rays.

It appears to me to be a first deduction from such a comparison that in all cases the bulk of the ionisation which the rays effect is of the same character, and consists in the displacement of slow-moving electrons, or δ rays, from the atoms of the gas or other substance which they traverse. Let us consider the various rays in turn.

In the case of the cathode rays this principle has been clearly established by Lenard in the course of his long series of beautiful experiments. He has shown that cathode rays of the most varied speeds, impinging on bodies of various kinds, or traversing different gases, cause the liberation of slow-speed electrons from the atoms of the solid or gas. The speed of the electrons is in every case that due to the fall through less than ten volts. This is in no way a contradiction of the fact that cathode rays of high speed are also liberated from a solid surface struck by primary cathode rays; or from the atoms of a gas through which the primary rays pass. But, whether these high-speed secondary rays are scattered primary rays, or are true secondary rays, they must in their turn produce electrons of slow speed in the gas through which they pass; and so, directly or indirectly, by primary or secondary or tertiary or rays still more transformed, eventually the great majority of the electrons set free in the ionisation-chamber of ordinary experiment are of the slow-speed type.

In the case of the α rays there is abundant evidence that their impact on, or emergence from, solid surfaces causes the ejection of slow-speed electrons. (J. J. Thomson, Cambridge Phil. Soc., Trans., February, 1905; Rutherford, "Nature," March 2, 1905; Logeman, Proc. Roy. Soc., September, 1906.) Now, it is generally characteristic of all these electric radiations that they are concerned with the individual atoms and molecules, and that they do not recognise any difference between the atom in the solid and the atom in the gaseous condition. Consequently, there is every reason to suppose that the heavy ionisation caused by an α particle in traversing a gas consists in the production of the same slow-speed electrons as are set free from a solid, and indeed no trace of faster-moving electrons has ever been found. The slow-speed electrons originated by α rays have been called δ rays, and the term may be applied to all such slow-speed electrons as we are now considering.

Again, it has been shown by Fuchtbauer (Phys. Zeit., November 1, 1906) that δ rays are emitted from a metal surface struck by canal rays, and here also there is every reason to suppose that gas molecules struck by such rays emit the same δ particles. The same author has shown by a direct comparison that the velocity of these particles is the same as that of the δ rays displaced by cathode rays, *i.e.*, about $3{\cdot}3 \times 10^8$ cm./sec., or the velocity due to about 20 volts, a velocity only slightly larger than that found by Lenard.

As regards β and γ rays, it is true that it has not been definitely proved that most of the ionisation which they cause is of the δ type. But this may be inferred from well-known experiments, such as those of Durack (Phil. Mag., May, 1903), or McClelland (Trans. Roy. Dub. Soc., February, 1906). When a pencil of β radiation is allowed to cross an ionisation-chamber normally, and fall upon the opposite wall, it gives rise to a secondary ionisation, less in quantity but not much less in speed than the primary. A tertiary radiation is caused by the secondary rays if they impinge on the walls of the chamber, and there will doubtless be still further derivations. But it appears that the quantity of the derived radiations dies away much more quickly than the speed. Thus the chamber is crossed and re-crossed (a few times) by electrons of high speed, able to traverse an average path of about 100 cm. in air at atmospheric pressure. If the chamber is first exhausted and air gradually admitted, it is found that the number of ions produced by the β rays is proportional to the pressure. The paths of the β rays will not be appreciably affected by the introduction of the air; and so the experimental results are consistent with the simple hypothesis that the β particle (primary or secondary) makes slow-speed ions in proportion to the number of gas atoms traversed. Nor does any other hypothesis seem to be consistent with the facts. It cannot be supposed that the bulk of the ionisation which is caused in the ionisation-chamber consists of high-speed secondary rays, though, of course, these are originated when the primary rays strike the metal surface of the chamber, and to a small extent when they strike gas molecules. For if all the negative electrons set free by the β rays were of high velocity we should expect certain effects, as may be seen from the following considerations, and none of these effects have been observed.

Rutherford has shown (Radio-activity, 2nd edition, p. 434) that the α particle of Ra makes about 86,000 ions in air; that one β particle is emitted from Ra for every four α particles; and that the ionisation due to β particles is of the order of 1 per cent. of that due to α particles in the case of Ra in equilibrium. Thus the β particle of Ra produces some thousands of ions. This is also evident from the experiments of Durack (Phil. Mag., May, 1903), who has shown that the β particle produces about 130 ions per cm. in air at atmospheric pressure. Now, the β particle runs a course in the open air of an average length of 100 cm. This leads to an estimate of its ionisation even greater than that obtained by Rutherford. If all the electrons, so liberated, had a high velocity, the energy set free would be out of all proportion to that of the original β particle. Yet if we are to ascribe a high velocity to the electrons set free, it must be a very high one, for it has been shown by Allen (Phys. Review, August, 1906), that the secondary radiation of β rays consists of electrons moving with a speed approximating to that of the primary. We cannot suppose that all these electrons are of this high-speed type. Moreover, if this were the case, the free path of such electrons would become comparable with the dimensions of the ionisation-chamber, when the air pressure was only moderately reduced, and the electrons would then be beyond the control of the electric field. Thus the ionisation would not be proportional to the air pressure, as was found by Durack and McClelland. The difficulty as to the energy is not obviated by supposing each primary β particle to set free only a few secondary electrons of high speed, each of these to become in turn the originator of a few more, and so on. For if that were the case, a reduction of gas pressure would imply, not only that each primary electron set free fewer secondary electrons, but that each of the latter set free fewer tertiaries, and so on, so that the ionisation would fall at a far greater rate than the pressure as soon as the free path of the electrons became comparable with the dimensions of the chamber. And, again, the β rays differ only in speed from cathode rays, which produce quantities of slow-speed electrons, even where their own velocity is great.

For these reasons I think it must be concluded that the β particle (and any high-speed secondary) produces slow-speed electrons along its path, in very much the same way as the α particle does, though not in such great numbers. The high-speed secondary rays, studied by McClelland, Allen, and others, are but few in number compared to the slow-speed electrons, though their greater energy puts them more in evidence. McClelland concludes from his experiment that the β rays do not produce any slow-speed electrons, when they strike a metal surface, which are comparable in number with the electrons displaced in the gas through which they have passed. This is quite consistent with what has been said above. There must be a few, but the number to be expected is quite small, for the β electrons dive so deep into the metal which they strike, and ionise so few of the molecules through which they pass, that very few of the slow-speed, highly-absorbable electrons can be discharged from the surface of the plate. Even in the case of the α particle these electrons are not readily observed; in the case of the β particle the difficulty must be much greater.

As regards X-rays, we have no such accurate measurements of the velocities of the electrons which are ejected from the molecules of a gas traversed by the rays, as we have in the case of the cathode rays, so far as I am aware. But a very large amount of labour has been spent on the investigation of the secondary radiation caused by the X-rays, from which we may gather much indirect evidence on the point. Perrin (Ann. Chim. Phys., xi., p. 496, 1897), has shown that the rate of production of ions per cc. by rays of given intensity is proportional to the pressure of the gas. Again, we know from the investigations of Curie and Sagnac, Townsend, and Barkla that metals struck by X-rays return a secondary radiation, which, in the case of the low atomic weights, may be considered to consist principally of scattered primary radiation, and in the case of the high atomic weights to contain both X-rays more absorbable than the primary and cathode rays. Dorn has shown that the latter have speeds averaging about 5×10^9 cm., so that they must produce considerable ionisation, consisting of δ rays, in the few millimetres of air close to the metal. The free path of electrons having this speed is about one millimetre in air at atmospheric pressure. Since the X-rays do not appear to produce cathode rays of any speed from the air molecules, which they traverse, or from the molecules of any gas consisting of atoms of small weight, and since they produce much ionisation in some way or other, we may conclude fairly that they produce slow-speed ions themselves. Thus, whether they act directly or indirectly through cathode rays, the result is the same. The principal effect appears to be due rather to secondary than primary. As Sagnac remarks (Ann. Chim. Phys., 23, p. 196): "The transformation of X-rays, by increasing the activity at any point, permits the detection there of very penetrating X-rays, which would otherwise have passed unperceived."

In the case of the γ rays, such evidence as we have is also in favour of the existence of slow-speed ions, as the result of their action. It is known that β rays of high speed originate where they strike the molecules of a solid body (Eve, Phil. Mag., December, 1904); such an action may, therefore, be expected in the case of gas molecules also. It is possible, however, that there may be a differential effect in respect to heavy and light atoms, as in the case of the X-rays. The β rays will produce δ rays in their turn; and if, as is probably the case the γ rays are themselves able to ionise, the product will consist of δ rays, a conclusion which may be safely adopted from the analogies of the cathode rays on the one hand and the X-rays and ultra-violet light on the other. As in the case of the hard X-rays, the existence of γ rays is often made clear by the secondary effects which they produce, as has been shown by Becquerel.

To sum up what has been said, the ionisation which we measure in the ionisation chamber is almost wholly due to the emission of slow-speed electrons from the atoms of the gas contained in the chamber, or of the chamber walls; and this is true for all forms of radiation.

Moreover, there is some evidence to show that the speed of the δ rays is almost independent of the cause and manner of their production. As has already been said, Fuchtbauer found the velocity of the δ rays, caused by canal rays, to be about $3{\cdot}3 \times 10^8$, and the same in the case of cathode rays. Logeman found the velocity of the δ rays, emitted from a plate struck by α rays, to be such that they were deflected by a weak magnetic field. Ewers found (Phys. Zeit., March, 1906) the δ rays of polonium to possess a speed of $3{\cdot}25 \times 10^8$. With these may be compared Lenard's estimate, viz., 10^8, of the speed with which the ions leave a plate struck by ultraviolet light. It seems probable that we have here a critical speed for the electron. Below this, it is not able to leave the parent atom. If its velocity exceeds the critical amount it possesses powers of penetration and of causing ionisation, the extent of these powers depending on the excess.

The existence of a common speed for all δ rays may, of course, imply that the ejection is not directly effected by the ionising agent, but that the latter simply precipitates the discharge. A man running through a battery might pull the triggers of some or all of the guns which it contained, and the velocity of the shot would not depend on the strength of the man, nor the rate at which he ran, nor how much energy he spent in the transit. And so it may be understood why δ rays are projected at a speed which is independent of the nature of the agent, as has been said above. So also it appears to be independent of the intensity of the agent's action. Fuchtbauer found the velocity of the δ rays produced by canal rays to be independent of the intensity of the primary rays; Lenard found the same for ultraviolet light. In my own experiments on the α rays (Phil. Mag., March, 1907), I have brought forward evidence to show that the amount of ionisation produced in an atom is proportional to the volume of the atom approximately. Taking this in conjunction with the rule that the ionisation produced in a gas is nearly proportional to the inverse of the speed, we have the very simple, if approximate, law, that the ionisation produced by an α particle in any atom under any circumstances is inversely proportional to the time spent inside the atom. This appears to point to the ionisation as purely a trigger effect. Not that the α particle spends no energy in the atom; it is clear it must do so, since its speed is gradually reduced, but there is not a direct connection between the energy spent and the number of ions produced. But whatever energy the ionising agent may spend, or in whatever way it spends it, it seems likely that the issue of the δ particle is the result of some disruption in the atom, or sub-atom, which is the same for all atoms and under all circumstances.

If we turn our attention now to all secondary radiation other than the δ rays, it seems to be, in general, a rough reflection or scattering of the primary. Allen has shown that there is only a little less velocity in the secondary rays than in the primary β rays, or in the tertiary than in the secondary. McClelland has measured the total ionisation produced by the secondary as compared with the primary β radiation; and since he used a small ionisation-chamber with which he explored the whole space traversed by the secondary rays, which chamber the secondary rays would, as a rule, completely cross if they entered it, it may be taken that he really compared the number of β particles in the secondary beam with the number of those in the primary. The numbers which he obtained varied from 15% to 50%, according to the substance, which is the order of things we should expect if the secondary were simply scattered primary radiation. Again, the loss of velocity of the cathode particles, which is found to occur on scattering at a plate, presuming the secondary radiation to be scattered primary, is just what we should expect. In the case of the α rays no secondary radiation other than δ rays has been found; but a small reflection of canal rays has been observed, *e.g.*, by Fuchtbauer (Phys. Zeit., March 1, 1906). Barkla has shown that the secondary radiation produced by X-rays consists in part of scattered primary radiation especially when the surface struck is of material whose atomic weight is low. The only cases in which a secondary radiation appears that is neither δ radiation nor reflected primary are those in which β rays are produced at the impact of X- or γ rays, and in which X-rays are produced by cathode rays. It is remarkable that in the former of these cases there is very great difficulty in accounting for the high speed which is possessed by the secondary radiation, caused by X-rays and γ-rays (Wien, Ann. d. Phys., December 28, 1905). It may well be that further research will bring these cases into better agreement with the rest.

The next question which it is interesting to consider in relation to the various types of radiation is that of the law of absorption in passing through matter.

Absorption in the case of the material radiations appears to be due to two main causes: loss of energy, which causes a gradual loss of speed; and scattering, which means a diminution in the number of particles in the primary beam. There is a possibility of a third, viz., absorption of the flying particle by an atom which it is traversing.

In the case of the α particle, I have shown that the first of these causes operates alone, so that the particle pursues a rectilinear course throughout its career (Australasian Association for the Advancement of Science, January, 1904; Phil. Mag., December, 1904). It is the absence of any effective amount of scattering that makes the study of the motion of an individual α particle comparatively simple. The loss of energy in traversing an atom, or more exactly the probable loss in crossing a given space occupied by an atom, is nearly proportional to the square root of the atomic weight, and the effects appear to be exactly additive.

On the other hand, if we consider a stream of β particles projected into matter, and attempt to find the history of their motion, we are faced with a problem of great complexity. If we look for an answer expressed statistically we must find the number of particles in each unit volume of the absorbing matter as a function of the time, the velocity, and the direction of motion. If, on the other hand, we try to follow the motion of any one particle, we must find the chance that the particle considered has any particular position, velocity, and direction of motion at any given time; which is really equivalent to finding the function just mentioned. Moreover, the data are very uncertain. We know so little of the interior of the atom that we are unable to say with what forces the electrons will be influenced when it penetrates within; whether, for example, we may neglect the action of the positive electricity of the atom, and consider only the electrons as repelling the β particle with a force varying as the inverse square of the distance, or whether we are to consider positives and negatives arranged in doublets, whose moment will be the important power, and whose law of attraction will not be that of the inverse square. It is a certain simplification to suppose that scattering is mainly responsible for the fading away of a stream of β particles. The experiments of Allen, McClelland, and others show that the secondary radiation has a velocity not much less than that of the primary; and, therefore, that this simplification is justifiable; though, clearly, it cannot be pushed too far. This allows us to concentrate our attention on the deflections of the particles only; but even then the difficulties are still immense. It is not like any problem in the kinetic theory of gases, for there we deal with established conditions; here with a gradual development from initial conditions.[1]

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[1] In his Conduction of Electricity Through Gases, 2nd edition, p. 376, Professor Thomson investigates the motion of a stream of β particles through an absorbing layer. It appears to me—I say it with very great diffidence—that the solution does not take a true account of the facts. The solution may be stated briefly thus:—Taking u, v, w as the components of the velocity V of the moving corpuscle, an expression is found for the probable change in u at the next encounter. Calling this change δu, we have $\delta u = -uK$, say, where K is a function of the mass of the corpuscle, the effective mass of the electron of the absorbing body, the velocity V of the corpuscle, which is taken as constant, the atomic charge, and the shortest distance between two corpuscles in the atom. K is then multiplied by the probable number of encounters in moving a distance δx along the axis of x, from which follows an exponential law for u in terms of x. It seems to me, in the first place, that, assuming such a multipli-

But if we turn from the theoretical to the experimental investigation we find a much more encouraging prospect. The experiments of Lenard are practically a complete graphical solution of the question. (See Taf. iv., Wied. Ann., Bd. 51). We know that an assemblage of atoms behaves just the same in respect to these radiations, when it is condensed in a solid or spread out as a gas. Thus the sketches which Lenard gives us showing the way in which the cathode rays diverge from a small window and scatter in going through various gases at different densities must be quite applicable to solids also.

Lenard found that his results could be accounted for on the supposition that there was an absorption according to an exponential law, over and above the weakening due to spreading from a centre.

If a β particle or cathode particle were liable to complete absorption by an atom which it entered, such an exponential law would result at once. As a matter of fact, it looks as if several violent deflections might take place before the final disappearance of the particle's activity. It looks, also, I think, as if deflections were usually not at all great during the progress of the particle through the atom, but were apt to be severe when they did happen, as if, in fact, the field of force which deflected the particle was strong but circumscribed. This would happen if the positives and negatives were arranged in doublets. When a particle is deflected from a beam crossing a thin plate, it starts off on a new path which leads much less directly to the open air, and its velocity is somewhat diminished. It may be, therefore, that the infrequency but severity of the particle's encounters makes it possible to look upon each encounter as an absolute, or at least a definite, loss to the stream, so that an exponential law results.

Certainly the application of this law to the interpretation of experiments has had very great success, both in respect to cathode and to β and γ rays. As examples of the latter we may take Rutherford's determination of the absorption of the β rays of uranium, and Godlewski's similar determination

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cation to have any meaning, the proper factor should have been greater than that adopted in the proportion of V to u, for in advancing a distance δx along the axis of x the corpuscle moves a distance $V\delta x/u$, not δx. If this change is made, the exponential form disappears from the answer. But, apart from this, it does not seem that the step is justifiable at all. It is tantamount to putting the corpuscle back in its old track after each encounter, and is equivalent to neglecting the existence of the function mentioned above, and the absolute necessity of finding it.

for actinium (Jahrbuch der Rad. und Elek., Bd. iii., Heft 2, p. 159). In experiments of this kind the radiating material is spread evenly on a level surface, and sheets of absorbing material are placed upon it. The ionisation produced in the space above the sheets is compared with the thickness of the sheets; and the two variables are found to be connected together more or less exactly by an exponential law. There is some difficulty whether such measurements give more nearly the number or the energy of the stream of particles which emerges from the plate, as Rutherford (Radio-activity, 2nd Ed., p. 134), and Thomson (Conduction through Gases, 2nd Ed., p. 375), have pointed out. The point was also discussed in my address to Section A of the Aus. Ass. for the Adv. of Science, Dunedin, 1904, p. 69. There is also an uncertainty due to the application of a formula to radiation from an assemblage of points which is really only applicable to a plane wave, or a stream moving normally to the plate. If a point source of radiation is placed below an absorbing plate of thickness d, and there is a true co-efficient of absorption λ, the fraction that emerges from the further side of the plate is not $e^{-\lambda d}$; much of the radiation passes obliquely through the plate and is absorbed to a greater degree than that which passes normally. This has often been pointed out, *e.g.*, by N. R. Campbell (Phil. Mag., April, 1905, p. 541), who also gives some figures from which the proper curve of absorption may be drawn. I am not aware, however, that it has been noticed that the form of the absorption curve, which is far from an exponential curve for a thin radiating layer, approximates much more closely to it for a thick radiating layer. And it is interesting to find that the experimental curves which are most nearly exponential are those for which the layers of radio-active material were thick compared to the penetration of the rays under investigation. As examples, we may take those of uranium and actinium already mentioned. On the other hand, the curve which H. W. Schmidt (Ann. d. Phys., Bd. 21, 1906, p. 651) has obtained for the β rays of RaC, the radio-active material being deposited in a very thin layer on metal foil, shows just about the amount of departure from the exponential form which is to be expected if the absorption is truly exponential, and there is only one absorption co-efficient, not two, as Schmidt has suggested.

The following figures give the proportional amount of the original radiation which passes through a plate of thickness n/λ, where λ is the absorption co-efficient: (1) for a thin layer; (2) for a thick layer. The figures are also given, for the sake of comparison, for the case of a plane wave, or a pencil of rays passing through the plate normally:—

n.	Radiation from thin layer.	Radiation from thick layer.	Plane wave (purely exponential).
·0	1·000	1·000	1·000
·1	·723	·834	·905
·2	·573	·702	·819
·3	·467	·600	·742
·4	·387	·510	·671
·5	·323	·437	·607
·6	·274	·378	·548
·7	·235	·328	·498
·8	·200	·283	·450
·9	·171	·248	·405
1·0	·145	·214	·368

The absorption of a material used in a thin sheet naturally appears greater than the absorption when the thickness of material is increased, because the rays which are moving obliquely are absorbed first.

The absorption of γ and X-rays appears to follow a purely exponential law so far as experiment has been made. The δ rays are absorbed by molecules immediately on their production, and cannot be said to show absorption effects.

Having thus discussed the properties of the various rays which do exist, it seems interesting to make an attempt at the estimation of the properties of some rays which might exist, though the fact has not been proved as yet. Radioactive substances emit both positive and negative particles. It does not seem at all out of place to consider the possibility of the emission of neutral particles, such as, for example, a pair consisting of one α or positive particle and one β or negative particle. The recent additions to our knowledge of the laws of absorption of α and β particles give us some grounds on which we may attempt to found an estimate of the properties of such pairs.

We know that the α particle moves in a rectilinear course throughout its whole range, and passes through the atoms which it encounters without deflection. It does not pursue a course which is straight on the whole, but zig-zag in detail; the direction and amount of a particle in motion are the whole characteristics of that motion at any instant, and no memory of any previous motion exists. If, therefore, a particle pursues a straight line in its motion as a whole, it must keep to that line entirely and make no excursions from side to side. We must, therefore, suppose that an atom, or at least an α particle, endowed with sufficient speed, can pass directly through another atom without appreciable deflection. The α particle loses speed as it penetrates atoms in this way; and there can be little doubt that its charge, that is to say, the field which is about it, is a main cause of this loss of energy. But if a β particle is associated with the α particle so that the tubes of induction pass from one particle to the other, and the field is greatly contracted, it would seem that the chief cause of the stopping of the α particle has been removed.(2) The penetrating power of a pair might be very great indeed, and its ionising power correspondingly reduced; for, although there does not seem to be a direct connection between energy spent and ionisation produced, there can be no doubt that the two are simultaneous. The limitation of the field of the pair would depend on its moment; if the latter was small, that is to say, if the positive and negative were close together, the field would be more circumscribed. It is, therefore, possible to provide for pairs to have varying penetrating and ionising powers; a pair of small moment being a good penetrater but a bad ioniser. Such a pair would be incapable of deflection by magnetic or electric fields, and would show no refraction. It is conceivable that it might show a one-sided or polarisation effect, for if it were ejected from a rotating atom it would itself possess an axis of rotation.

When X-rays were first investigated, and again when γ rays were discovered, it was often suggested, in each case, that the radiation might consist of material particles. Röntgen himself proposed in the third of his memoirs a theory of this nature. But it was always felt that the difficulty of accounting for the great penetration of these radiations was insuperable. It seems now that this difficulty was quite exaggerated, and even imaginary. It does not appear out of place, therefore, to reconsider the position in the light of the more recent knowledge.

Assuming, then, that the neutral pair has great penetrating, but weak ionising, powers, is uninfluenced by magnetic or electric fields, and shows no refraction, it does so far conform to the properties of the γ ray. And, further, if it has any moment at all, and therefore any external field, it may at last suffer some violent encounter which will resolve it into a positive and a negative, an α and a β particle. Of these the β particle would be the one possessed of much the greater velocity, and would appear as a secondary ray. Thus, in the neighbourhood of the point of impact, an ionisation would appear of much greater intensity than anything produced along the track of the pair itself. So Becquerel has found the action of the γ rays on a photographic plate to be almost entirely due to the secondary rays which they produce.

(2) See also Rutherford's Radioactive Transformations, p. 272.

On this view the appearance of the β secondary ray would be really a scattering of the incident ray; and this would make the γ ray fall into line with other radiations whose secondary radiations are either scattered primary or δ rays.

If the gradual disappearance of a stream of γ radiation were caused by collision in this way, the number disappearing in any unit of length of the course would be proportional to the total number in the stream, so that an exponential law would result.

It appears, therefore, that all the known properties of the γ rays are satisfied on the hypothesis that they consist of neutral pairs.

It is interesting to carry the speculation a little further, and to observe that a pair possessing a very circumscribed field might exhibit no ionisation effects whatever, and be capable of very great penetration. Its final end might be an incorporation into an atom traversed (as has been suggested to me by Professor Rutherford in reference to the α particle). Thus, penetrating radiation of this kind might exist in some quantity without our being aware of it, and might be an important agent in the breaking down and building up of atoms.

If we attempt to explain the properties of the X-ray on the supposition that it is a neutral pair, we meet with a difficulty which does not occur in the case of the γ ray. For it has been shown by Marx (Phys. Zeit., p. 268, 1905) that certain X-rays move with the velocity of electric waves in wires, and therefore of light. Now, it is difficult to conceive that material particles can move with such a speed and yet be scattered on impact with atoms. Yet in other ways the behaviour of X-rays is so consistent with what we should expect on a neutral-pair theory that it does not seem either useless or uninteresting to consider the matter from that point of view.

In the first place we have the necessary absence of deflection in electric and magnetic fields, and of refraction; the possibility of a kind of polarisation quite different in character to that of light; great penetration, whose amount may vary with the moment of the pair, or with the velocity if the latter is a variable; the production of secondary rays when the ray strikes an atom, with an easy explanation of why the ray, when striking a light and yielding atom, is reflected more or less unchanged, yet, striking a heavy atom, is shattered with the production of much easily absorbed secondary radiation of the cathode ray type (Barkla, Phil. Mag., June, 1906). If the X-ray is an ether pulse it is difficult to understand, as Thomson has shown (Conduction of Electricity through Gases, pp. 294-297), why the spreading pulse should only affect a few of the atoms passed over, why the secondary cathode rays are ejected with a velocity which is independent of the intensity of the pulse which weakens as it spreads, and why it should be able to exercise ionising power when its energy is distributed over so wide a surface as that of a sphere of, say, ten or twenty feet radius. All these phenomena are capable of quite simple explanation if we suppose the ray to be a neutral pair which has only a local action, *i.e.*, can only affect the molecules which it traverses, which can penetrate to great distances, which loses very little speed as it goes, and gives rise to a cathode ray when it is broken by impact.

The hypothesis can readily be developed so as to furnish an explanation of the polarisation effects which Barkla *(loc. cit.)* has worked out with so much success. If the cathode particles so affect the motion of an atom as to make it throw off a pair, then the plane of rotation of the pair will contain the direction of its translatory motion. And if such a pair fell upon a reflecting surface, it might naturally be taken up only by an atom revolving in the same plane, and, if ejected again, continue moving and revolving in that plane, thus exhibiting exactly the effects which Barkla has found.

The sudden arrest of a cathode particle must originate an ether pulse. But, as a matter of fact, it has never been shown that such sudden stoppages do take place. Wien has calculated (Ann. d. Phys., December 28, 1905) that the particles must come to rest in a space of about 10^{-10} cm., if the energy of the X-rays is to be accounted for in this way, even supposing the whole of the cathode rays to be effective; and the appearances of the bundles of reflected β and cathode rays rather point to gradual deviations with a very slow diminution of energy, and therefore very little radiation. On the other hand, we know that atoms are set in motion with very high speeds inside the vacuum tube, and that the gas in the X-ray tube is largely driven into the walls (Campbell Swinton, Chemical News, March 22, 1907) in a manner which reminds us of α rays penetrating a solid.

It is possible that the example of the α particle shows that a pair cannot possess a velocity greater than 10^9, since at a higher speed it would be stripped of an electron, and become an α particle. J. J. Thomson has suggested that at this critical speed the α particle becomes electrically neutralized by the attachment of an electron. Presumably such a pair would then go on as a γ ray. No such consequence has been observed; and on the present hypothesis it would be better to suppose that the α particle ends its career by being taken up by an atom, as Rutherford has suggested. There is no reason to suppose the γ ray or X-ray to possess any great speed, so as to give it enough penetrating power. The latter might depend rather on the limitation of the field of the pair, and a sufficient range for the velocity can be found between the minimum speed of the a particle and the minimum speed necessary for penetration, which appears to be about 10^8 for a charged particle, but may be less for one without charge. A moderate speed would account for the reflection or scattering of the X-ray, and would indeed be necessary for this purpose. It is here that the neutral-pair hypothesis clashes with the experiment of Marx, and, unless some way out is found, must remain simply an interesting comparison. In the case of the γ ray the hypothesis seems to fit in very well with the known facts.

The Nature of Röntgen Rays.

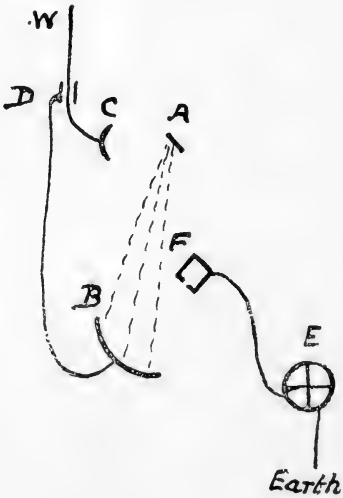
By W. H. Bragg, M.A., F.R.S., Elder Professor of Mathematics and Physics in the University of Adelaide.

[Read June 4, 1907.]

In a paper read before this Society at its last meeting (May 7, 1907), I pointed out that the properties of the X-rays were, with one important exception, generally consistent with the theory that they were of a material nature, being composed of neutral combinations of α and β particles. But it was difficult to reconcile this theory with the result announced by Marx, viz., that the X-rays possessed the velocity of light.

On further consideration of Marx's beautiful experiment I find that his result is by no means so antagonistic to the material nature hypothesis as I at first imagined it to be. To see this clearly it will be necessary to consider briefly the details of the experiment.

An electric pulse is made to travel along a wire, W, as shown in the accompanying sketch. When it reaches the cathode, C, cathode rays are driven against the anode, A, and X-rays are given out, some of which travel towards the saucer-shaped electrode, B. At the focus of B is a small Faraday cylinder, F, connected to an electrometer, E. A small impulse is derived from the wire, W, by electrostatic induction at D, and travels down to B. If the various distances



and wire-lengths are properly adjusted, so that the X-rays arrive at B at the same moment as the derived impulse, electrons are liberated at B by the rays, and guided by the impulse into the cylinder, F, and thence to the electrometer. If now the distance of the X-ray bulb from B is altered, say, by an increase of 10 cm., the wire from D to B has to be lengthened by 10 cm. Thus, according to Marx, the X-rays travel with the same velocity as the impulse in the wire, and therefore with the velocity of light.

But it is to be remembered that the electrons which are liberated by X-rays have an initial velocity averaging about 5×10^9 per sec., *i.e.*, a speed due to thousands of volts, and are scattered in all directions from the surface on which the rays fall. Neither the weak impulse applied to B by the wave coming along the wire, DB, nor the peculiar form of the surface, B, could have any sensible effect in the way of guiding these fast-moving electrons into the cylinder, F. Only slow-moving electrons or δ rays could be guided by such means. It is no doubt true that X-rays do liberate a certain number of δ rays, but it is clear that the experiment of Marx is quite consistent with the hypothesis that the X-rays are complex, and consist in part of ether pulses travelling with the velocity of light, and producing δ rays, and in part of material particles, or pairs, travelling at a speed as yet undetermined, and exciting high-speed cathode rays.

This being the case, it is desirable to consider the material-nature hypothesis more in detail, and to contrast it with that of the ether pulse.

In the first place, either theory can readily account for the great penetration of the X-ray, for the absence of true reflection and refraction, for the absence of deviation in electric or magnetic fields, and for polarization of a type somewhat different from that of light, and agreeing with experiment. I have discussed these points in the previous paper.

It seems to me that the material-nature hypothesis shows to advantage when we consider the secondary radiation of the X-rays. The rays cause the emission of cathode rays whose speed averages about 5×10^9 (Dorn). We have no experience of any ether wave causing the emission of any but δ rays, *i.e.*, electrons with a speed of about 10^8. It can hardly be said that differences in intensity of the ether pulse can account for this remarkable contrast. For the speed of the δ rays caused by ultra-violet light has been shown by Lenard to be independent of the intensity of the light; and the velocity of the X-ray secondary radiation does not depend on the intensity of the X-rays. It may be argued that the breadth of the pulse is the prime factor, on the grounds that

Lenard found the velocity of the δ rays due to ultra-violet light to depend somewhat on the nature of the light; but it is hard to believe that a diminution of the width of the pulse, no matter how extreme, can increase the energy of the ejected electron about a thousand times.

But if we regard the secondary radiation as the result of the break-up of a neutral pair, the high velocity of the ejected electron (5×10^9) may be more readily explained. The action must be entirely different from that of ultra-violet light.

It is difficult to found any arguments for or against either theory on considerations of the relative energies of the original cathode stream, the X-rays, and the secondary rays. For if the energies of any transformation do not balance, it is easy to square the account by postulating either some release of the internal energy of the atom, or the reverse, viz., the absorption of energy by the atom involving an apparent disappearance of the visible energy. In the case of the ether-pulse theory it is necessary to suppose that the secondary radiation derives its energy from the atom's internal store (Conduction of Electricity through Gases, 2nd Ed., p. 321). Also, as mentioned in the previous paper, there are difficulties in reconciling the proportion of X-ray energy to cathode-ray energy, with the probable circumstances of the impact of the cathode rays. (Wien; Ann. d. Phys., xviii., p. 991, 1905, and xxii., p. 793, 1907; van der Waals, Jr.; xxii., p. 603, 1907). On the neutral-pair hypothesis, the cathode rays would probably cause the release of the pairs, which would derive much of their energy of motion from the atom; it might not be necessary to invoke the aid of the atomic energy in order to account for the energy of the secondary radiation.

There is another entirely different argument, which seems to support the neutral-pair hypothesis.

The α, β, and γ rays all ionize the gases which they traverse. It has just been shown by Kleeman (1) that the ionisation per atom due to β and γ rays is nearly proportional to the ionisation per atom due to α rays (and, therefore, approximately proportional to the volume as I have shown, Proc. Roy. Soc. of S.A., Oct., 1906; Phil. Mag, March, 1907). The figures for the heavier atoms are rather larger for the β than the α rays, and still larger for the γ rays. It is known that the ionisations due to X-rays differ considerably from those due to γ rays

(1) Mr. Kleeman has been good enough to inform me of his results by letter; but I believe I am at liberty to quote them, since he has, I understand, recently read a paper on the subject before the Royal Society.

when the X-rays are soft; but approximate to them when the X-rays are hard.

All this fits in excellently with the theory that all four types of rays are material. Take the α particle first, since its circumstances are the most simple. It moves directly through the atoms, without scattering or transformation. It liberates ions in the form of δ rays as it goes, approximately according to the volume law. The β ray is also a charged particle, and it is readily to be supposed that it would, if its whole motion were rectilinear, liberate ions according to the same law (comparing atom with atom), as the α particle, though the numbers would be less. But the β particle is liable to scattering, and each act of scattering generally implies an increase in the length of the particle in the gas, and increased ionising power since its speed is a little diminished. Now, scattering is proportional to the atomic weight, whilst the ionisation is more nearly proportional to the square root of the atomic weight. Thus, a heavy atom is the cause of more than its proper amount of ionisation; and so we find in Kleeman's table that the ionisation of the atoms Cl, Br, and I are rather higher than in the case of the α particle. Again, the γ particle is liable to resolution into its elements, with a relatively large amount of ionisation. Since this transformation is chiefly effected by impact with heavy atoms, these latter will be the cause of a disproportionately large ionisation, as compared with the α rays; and this is also shown by Kleeman's figures. Passing on to X-rays we find a further illustration of this effect, until we come to very soft rays, when we find that the heavy atoms are the occasion of exceedingly large ionisation (Conduction of Electricity through Gases, 2nd Ed., p. 300). There is a good continuity in all these phenomena, with gradual divergences just where we should expect them. The α, β, γ, and X-rays all produce the same primary ionisation, comparing atom with atom, and differ only in the effects due to scattering and transformation; that is to say, differ only as regards their production of secondary ionisation. Now, the α and β rays are certainly material particles, possessing electric fields. There is, therefore, a reasonable argument that the γ and X-rays are also material, and possess electric fields. This is the case if they are pairs, and the smaller the moments are the more circumscribed are the fields and the less the ionisation and loss of energy.

If the X-rays contain ether pulses only, it is difficult to see why their effects should run so exactly in parallel with those of the α and β rays.

As I have already pointed out, the neutral-pair theory offers the more natural explanation of the facts that only a minute fraction of the atoms traversed by a bundle of X-rays are ionized, and that the character of the ionisation is independent of the intensity of the rays.

It is clear from Marx's experiment that some ether waves are present in a bundle of X-rays. Their presence will readily account for the diffraction effects of Haga and Wind.

To sum up a curious and interesting situation, it may be said to be clear that X-rays contain ether pulses, but that a large number of X-ray properties are not easy to explain on the hypothesis that the rays contain ether pulses only. The difficulties disappear on the hypothesis that they contain neutral pairs also: a hypothesis which is by no means improbable *a priori*. But the existence of these pairs has not yet been absolutely proved.

I should like to add one remark in reference to the γ ray. If the latter is material and contains an α particle, this fact must be considered in reckoning the number and magnitude of the steps from the atomic weight of radium to that of lead. It has been suggested to me by my colleague Dr. Rennie that the rayless changes of Ra may really be accompanied by the emission of neutral pairs of very small moment. This adds another unknown factor to the calculation. The energy involved in such emissions might be quite small, and, moreover, if pairs can be taken up into atoms, so as to form new atoms, the whole of the energy may not appear as heat.

Notes on South Australian Marine Mollusca, with Descriptions of New Species.—Part V.

By Jos. C. Verco, M.D. (Lond.), F.R.C.S. (Eng.).

[Read May 7, 1907.]

During the last session in Adelaide of the Association for the Advancement of Science, Mr. Hedley, of the Australian Museum in Sydney, kindly examined, with me, a number of my South Australian shells, and has since compared them with types in the Sydney Museum. We have thus been able to identify several of our forms. He also took with him all my Pteropods, and returned them named. A trip to the three bays in the South-East of our State—MacDonnell Bay, Guichen Bay, and Lacepede Bay—provided a quantity of minute beach material, which has already proved to be very rich in novelties, and has provided examples of larger shells in such excellent condition as to allow one to speak more certainly upon some previously questionable points.

Family PATELLIDÆ, Guilding.

Genus Patella, Linnæus.

P. ustulata, Reeve.

This species was found in abundance by me this year on the rocks at Western Beach, Robe. Here and at MacDonnell Bay it was seen in better condition and in greater numbers on the vertical face of the rocks, just above low water, than on the submerged reefs, less eroded and less encrusted. A variant was taken at Robe, suggesting at first a new species, a rather narrow oval shell, with 22 to 24 large, rounded, close-set radial costæ, with one feeble or no interstitial riblet. They were found, however, to merge insensibly into the usual forms.

P. hepatica, Pritchard & Gatliff.

At Beachport, on the shore, several dead shells were collected, some quite typical, with oblong oval border, and crowded, fine, equal radial riblets. But, though retaining this outline, their sculpture gradates into the sub-distant costæ with intermediate riblets of *P. ustulata*, Rve. In one individual the sculpture is that of *P. hepatica* until it is 18 mm. long, when 24 valid white scaly ribs arise. Another shell, measuring 41 mm. by 36 by 20, is provided only with uniform crowded finely-scabrous riblets, combining the sculpture of *P. hepatica* with the shape and size of the largest of our *P. ustulata*. Every gradation, too, can be traced between the oblong-oval and the roundly elliptical forms. The opinion expressed in Trans. Roy. Soc. South Aust., 1906, vol. xxx., p. 207, as to the identity of these two species is confirmed.

Genus Helcioniscus, Dall.

H. limbatus, Philippi.

Patella limbata, Philippi, Abbild. und Besch. Conch., vol. iii., p. 71, pl. iii., f. 2, 1849; Reeve, Conch. Icon., vol. viii., pl. xiii., f. 29, a, b, 1854; Angas, Proc. Zool. Soc. Lond., 1865, p. 185; Ten. Woods, Proc. Roy. Soc. Tasmania, 1877 for 1876, p. 48; also 1879 for 1878, p. 45; Pritchard & Gatliff, Proc. Roy. Soc. Vict., vol. xv. (new series), part 2, p. 192, 1903.

Patella (Helcioniscus) limbata, Phil., Pilsbry, in Tryon's Man. Conch., 1891, vol. xiii., p. 143, pl. lxxi., f. 53 to 56, and pl. xvii., f. 28, 29.

Hab.—That of the type is given by Philippi as "New Holland" (Largilliert); Reeve records it from "Signet Bay, North Australia: Dring"; Angas, "Port Lincoln, South Australia"; Ten. Woods, "Southport, Tasmania"; Pritchard and Gatliff, "Cape Otway, Victoria." It has been taken at the Neptunes and Thistle Island, and in Spencer Gulf by Dr. Torr; on Yorke Peninsula by Mathews; at Encounter Bay by myself. I did not find it at Kingston, Robe, Beachport, or MacDonnell Bay.

Dim.—The largest dimensions given by Ten. Woods are 71 mm. by 64 by 32; but one from Yorke Peninsula measures 77 by 64 by 33.

Philippi, Reeve, Angas, Pilsbry, and Pritchard & Gatliff regard it as a good species; but Ten. Woods in 1878 wrote: "I regard this shell as a variety, or not even a variety, of the preceding (*P. tramosericus*, Martyn). The somewhat broader ribs may distinguish it." Tate & May in their census of the Marine Moll. of Tasmania, Proc. Linn. Soc. of New South Wales, vol. xxvi., 1901, p. 141, accept this view. Among the shells collected by Dr. Torr in Spencer Gulf is a facsimile of Philippi's type figure, in shape, size, colour, and erosion. Others, up to 55 mm. in length, have the apex perfect. Instead of being yellowish they may be of a deep salmon tint, and instead of 32 may have only 22 ribs, much broader than in the type, and thus differ still more than this from *P. tramoserica*, Mart. On the other hand, a unicoloured salmon-tinted shell from Beard Peninsula, West Coast of South Australia, in its ribbing comes between both species; and a small shell from Encounter Bay in its shape and flat rounded ribs approaches *H. limbatus*, and yet in its 44 ribs and red, yellow, and black radial markings is allied to *H. tramosericus*. I lean to the view of identity with extreme variation; but my series is not very large, and does not furnish such gradations as to warrant an absolute conclusion.

Genus NACELLA, Schumacher.

N. parva, Angas.

Hab.—One example dredged dead at 62 fathoms N.W. of Cape Borda: several found in shell sand, Guichen Bay, which is its most easterly known station.

N. crebristriata, Verco.

Hab.—The type locality was not exactly known, but was judged to be Moonta Bay. I have since taken several examples in shell-sand at Guichen Bay. There are variations from the type. The anterior slope may be sub-convex, or it may be slightly excavated immediately below the apex. Some are more compressed laterally than the type, others tend more to an elliptical outline. There may be about sixteen equidistant pink radii, or the shell may be uniformly of a light pink tint.

N. stowæ, Verco.

Hab.—Guichen Bay beach, in shell-sand. No variations from the type.

Family ACMÆIDÆ, Philippi.

Genus ACMÆA, Eschsholtz.

A. flammea, Quoy & Gaimard.

Patelloidea flammea, Q. & G., Voy. de l'Astrolabe, Zool., vol. iii., 1834, p. 534, pl. lxxi., f. 15 to 24.

My observations on this variable shell in Trans. Roy. Soc. South Australia, vol. xxx., 1906, p. 212, were almost entirely based on dredged shells. A collection since gathered from the rocks at Robe, Beachport, and MacDonnell Bay enables me to add something further. As a rule the exposed shells are much more eroded, and their ribs are ruder and less numerous, and they are of the *A. jacksoniensis*, Reeve, form rather than of the *A. crucis*, Ten. Woods. Many of these were much narrowed anteriorly, so as to be really oval or egg-shaped instead of uniformly roundly elliptical. Some of the smaller individuals tend also to be pyramidal rather than conical, with four obsolete angles occupying the situation of the intervals between the arms of the Maltese cross. None were found with radial ribbing so fine as presented on some of the dredged specimens.

In most the cross was plainly visible, or indistinctly when held up to the light. One showed the anterior and both lateral arms fused into one mass, and the posterior arm very broad, so as to give a quite black shell with two narrow dead white radii at the postero-lateral parts. Another was a black shell with four narrow white radii. Another had five equal black arms, due to a white wedge in the centre of a wide posterior black patch. Another common peculiarity was that the white concentric band inside, just above the articulated dark and white border, had two radial extensions to the margin in the postero-lateral regions; and these, quite marked in the shells *with* the cross, were frequently distinct in those *without* the cross, and enabled the species to be certainly recognized.

Family COCCULINIDÆ, Dall.

Genus Cocculina, Dall.

C. coercita, Hedley.

Cocculina coercita, Hedley, Records of the Austr. Mus., vol. vi., part 4, 1906, p. 289, pl. liv., f. 1, 2.

Type loc.—80 fathoms off Narrabeen, New South Wales; also 300 fathoms east of Sydney (Hedley). South Australia, one example at 130 fathoms off Cape Jaffa (Verco).

Family VERMETIDÆ.

Genus Vermicularia, Lamarck, 1799.

V. Nodosa, Hedley.

Vermicularia nodosa, Hedley, Records of the Austr. Mus., vol. vi., part 4, 1906, p. 292, pl. liv., f. 8.

Type loc.—80 fathoms off Narrabeen, New South Wales.

Dredged, 55 fathoms off Cape Borda, many; 150 fathoms off Beachport, one (Verco).

Family TRITONIDÆ.

Genus Cymatium.

C. kampylum, Watson.

Nassaria kampyla, Watson, Jour. Linn. Soc. Lond., vol. xvi., p. 594.

Nassaria campyla, Watson, Chall. Rep., vol. xv., 1886, p. 405, pl. xiv., f. 12. *Type locality*, "Off Sydney, 410 fathoms, green mud." *Lampusia nodocostata*, Tate & May, Trans. Roy. Soc., S. Austr., 1900, vol. xxiv., p. 90; *type locality*, east coast of Tasmania, 2 examples (W. L. May),; also Proc. Linn. Soc. N.S. Wales, 1901, vol. xxvi., p. 355, pl. xxiii., fig. 2; *Lotorium nodocostatum*, Tate & May, Kesteven, Proc. Linn. Soc. N.S. Wales, 1902, vol. xxvii., pp. 463, 479, f. 1, 4; *Cymatium kampyla*, Watson, Hedley, Records of the Austr. Mus., vol. vi., part 3, p. 213.

The species was taken by Mr. Hedley and others in abundance at 300 fathoms, off Sydney, and with this material he was able to identify the Tasmanian shell with Watson's species. In my dredging off Beachport and Cape Jaffa I took more than 750 examples, mostly immature, and all dead. They ranged from 90 fathoms to 300; and were most common at 110, 130, and 200 fathoms. They appear to live at some greater depth, for the living example which formed the Challenger type was taken at 415 fathoms. Considerable variation from the type is seen. Its proportions are 1·67 inches long and ·8 broad, but these may be 1·45 and ·6, giving a much more slender shell. Some individuals are more solid than others, and these usually have bolder sculpture, in axial costæ and spiral liræ. This is very noticeable in the whorls following the protoconch; the first may be merely granulated, and the second show only obsolete radial and spiral sculpture. When there is any ornament it is seen as yellow-brown spiral bands between the raised liræ, generally three in the spire-whorls and about six on the body-whorl, the last two or three tending to fuse. They are interrupted by the varices, which remain white.

Family SIPHONARIIDÆ.

Genus Siphonaria, Sowerby, 1824.

S. diemenensis, Quoy & Gaimard.

S. diemenensis, Quoy & Gaimard, Voy. de l'Astrolabe, Zool., vol. ii., p. 327, pl. xxv., figs. 1-12, 1833; Reeve, Conch. Icon., vol. ix., pl. i., fig. 1, 1856; Ten. Woods, Proc. Roy. Soc. Tasmania, 1877, pp. 56 to 58; and 1878, p. 46; Adcock's Handlist of Aquatic Moll. of South Australia, 1893, No. 457; Tate & May, Proc. Linn. Soc. N.S. Wales, 1901, vol. xxvi., part 3, p. 418; Pritchard & Gatliff, Proc. Roy. Soc. Vict., 1903, vol. xv. (n.s.), part 3, p. 220.

S. denticulata, Quoy & Gaimard, *op. cit.*, p. 340, pl. xxv., figs. 19, 20; Reeve, *op cit.*, pl. i., fig. 4; Ten. Woods, *op. cit.*, 1877, p. 54, 56, and 1878, p. 47; Adcock, *op. cit.*, No. 454.

S. scabra, Reeve. Conch. Icon., vol. ix., pl. i., fig. 2.

Type loc.—Of *S. diemenensis,* D'Entrecasteaux Channel, Tasmania (Quoy); of *S. denticulata,* "The southern part of New Holland at Western Port, and probably also at King George's Sound" (Quoy); of *S. scabra,* Port Jackson (Reeve).

Obs.—Tate & May and Pritchard & Gatliff unite the first two as one species, and the latter authors unite all three.

Our shell is very variable. It may be high and steeply conical, or so depressed as to have only a trace of cavity: rarely thin and delicate, generally of moderate thickness, sometimes quite solid. The ribs may be as few as 17 or very numerous, distant, or crowded; high, narrow, and sharp-cut, or low, broad, and rude; straight, smooth, and regular, or crooked, rough, irregularly noded, or scabrous. Rarely they are quite colourless, when taken alive; or yellowish, with faint smokiness in the intercostal spaces. They are brown throughout, or with bluish-white ribs and bluish-black between. But all these variations intergrade. It extends all along our coastline.

S. baconi, Reeve.

S. baconi, Reeve, Conch. Icon., 1856, vol. ix., pl. vi., fig. 30; Pritchard & Gatliff, Proc. Roy. Soc. Vict., 1903, vol. xv. (n.s.), part 3, p. 221.

Type loc.—"Swan River."

The three shells from the Cuming Museum in the Natural History Museum (Brit. Mus.), London, from Swan River, labelled *S. baconi*, Reeve, are similar to ours. It was given in Adcock's Handlist, No. 455, as *S. luzonica*, Reeve; but the types of this species, and from which his figures were drawn, are from the Philippine Islands, and have only 9 to 13 ribs, much stouter than ours. *S. baconi* is probably the species catalogued by Tate & May in their Tasmanian Census as *S. albida*, Angas, in Proc. Linn. Soc. New South Wales, 1901, vol. xxvi., p. 419.

It has been taken from MacDonnell Bay to Streaky Bay, and up St. Vincent and Spencer Gulfs. It is found on the rocks in the South-East, which are completely exposed at low tide, and on the reefs which are not exposed; also on the ocean shore, subject to the rough seas from the break of the rollers, and the smooth water in the quiet bays and gulfs. The shells appear to be larger in the rougher South-East than in quiet places like Hallett Cove, etc. The size may reach 30 mm. by 23 by 5·5. They are very flat, as low as 4·75 mm. in a shell of 25 mm., the greatest height being 6 mm. in a shell of 20 mm. They are mostly roundly elliptical, rarely nearly circular, more rarely oblong-elliptical. Usually they are quite thin, but those from rough water may be very solid. Generally much eroded, especially when senile, they may show no sculpture. There may be only 17 to 20 ribs standing up validly above all secondary riblets, or there may be 44 nearly equal radii. Their colour is a dull white, rarely yellow. In some, especially in juveniles, or the earlier portions of mature ones, and in the thinner forms, tiny blackish or brownish spots may be scattered about irregularly, sparsely, or abundantly, or they may form clouds, rings, or patterns. The interior is quite white, the horseshoe amber-coloured. Sometimes within the horseshoe, and in a depression in front of it, and along the siphon furrow, is a fuscous clouding. The animal is of a light saffron-yellow colour.

S. albida, Angas.

S. albida, Angas, Proc. Zool. Soc., Lond., 1878, p. 314, pl. xviii., figs. 16, 17; Adcock, Handlist, etc., 1893, p. ii., No. 456.

Type loc.—St. Vincent Gulf, South Australia.

I examined the shell at the Natural History Museum (Brit. Mus.), London, in 1899. It was mounted as "Type

Adelaide." I could not match it; it is more conical than any *S. baconi*, Reeve, I had or have since obtained. It is very thin, but is evidently not a worn shell, and is very glistening internally. It must be an extreme variant if it be *S. baconi*. May it be an albino of one of the forms of *S. diemenensis*, Quoy?

S. zonata, Tenison Woods.

S. denticulata, Quoy & Gaimard, var. *tasmanica*, Ten. Woods, Proc. Roy. Soc. Tasmania, 1877, p. 54; *S. zonata*, Ten. Woods, *op. cit.*, 1878, p. 99, and p. 47; Pritchard & Gatliff, Proc. Roy. Soc. Vict., 1903, vol. xv. (n.s.), part 3, p. 221.

It was listed by Tate and May in their Census for Tasmania, as *S. tristensis*, Sowerby, in Proc. Linn. Soc. New South Wales, 1901, vol. xxvi., pt. 3, p. 419, by misidentification.

It is found at MacDonnell Bay on the rocks above low water, and at Beachport, mostly much eroded. But perfect specimens may attain full size of 22·5 mm. by 19·5 by 9, and may show a perfect protoconch of a deep brown colour, hooked backwards, and spirally curved, with the nucleus of a deep amber tint deviated to the left, on which side alone its two whorls, quite distinct, smooth, round, and slightly elate, are visible.

S. stowæ, Verco.

S. stowæ, Verco, Trans. Roy. Soc. South Austr., 1906, vol. xxx., p. 223, pl. viii., figs. 3 to 8.

Type loc.—Pondolowie Bay, Spencer Gulf. The habitat has not been extended beyond Encounter Bay.

Family GADINIIDÆ, Gray.

Genus Gadinia, Gray, 1824.

G. angasi, Dall.

Gadinia conica, Angas, Proc. Zool. Soc. Lond., 1867, p. 115, No. 27, pl. xiii., fig. 27. *Type locality*, "Port Jackson Heads (Coll., Angas)"; also p. 220, No. 221, "Coodgee Bay."

Gadinia angasi, Dall, Amer. Jour. Conch., 1870, vol. vi., p. 11; Pritchard & Gatliff, Proc. Roy. Soc. Vict., vol. xv. (n.s.), part 3, p. 222, "Portsea, Port Phillip; Western Port."

Taken on the ocean beach at Port MacDonnell, Beachport, and Robe, not rare, and in good condition (Verco); Head of Great Australian Bight (Tate); Rosetta Head, Encounter Bay (Tate).

Family MODIOLARCIDÆ, Gray.

Genus Modiolarca, Gray.

M. tasmanica, Beddome.

Modiolarca tasmanica, Beddome, Proc. Roy. Soc. Tasmania, 1881, p. 168; Cloudy Bay, South Bruni Island, and off Brown's River: Tate & May, Proc. Linn. Soc. N.S. Wales, vol. xxvi., 1901, p. 439, Text, fig. 12.

It was found by me in Guichen Bay, in a small sandy cove between two rocky prominences, which projected into the sea. Just beyond the margin of the receding wave it formed an abundant dark reddish-brown shifting sediment, with tiny fragments of brown seaweed. It was scooped up in hundreds with a spoon, mixed with *Philippiella crenatulifera*, Tate, and *Neolepton rostellatum*, Tate. It had not previously been recorded for South Australia. It was taken also in Lacepede Bay in numbers, and in small quantity at MacDonnell Bay.

Family MYTILIDÆ, D'Orbigny.

Genus MODIOLA, Larnarck.

M. linea, Hedley.

Modiola linea, Hedley, Records of the Austr. Mus., vol. vi., part 4, 1906, p. 300, pl. lvi., figs. 23, 24, 25.

Type loc.—80 fathoms off Narrabeen, New South Wales.

Dredged, 104 fathoms, 35 miles S.W. of Neptune Islands, 34 valves, 1 alive (Verco).

Family LEPTONIDÆ, Gray.

Genus NEOLEPTON, Monterosato.

N. rostellatum, Tate.

Kellia rostellata, Tate, Trans. Roy. Sec. South Austr., 1888 (1889), vol. xi., p. 63, pl. xi., fig. 14. *Type loc.*, Port Phillip Heads, Victoria, dredged alive, 7 to 9 fathoms, attached to seaweed; Tate & May, Proc. Linn. Soc. N.S. Wales, 1901, vol. xxvi., p. 432, King Island.

Neolepton rostellatum, Tate, Hedley. Pros. Linn. Soc. N.S. Wales, 1905 (1906), vol. xxx., part 4, p. 542, pl. xxxi., figs 3, 4.

Taken in numbers alive at the water's edge in Guichen Bay, also in shell-sand in Lacepede Bay, and at MacDonnell Bay. Not previously recorded for South Australia.

BRACHIOPODA.

Cryptopora brazieri, Crane.

Atretia brazieri, Crane, Proc. Zool. Soc., 1886, p. 183.

Cryptopora brazieri, Crane, Hedley, Proc. Linn. Soc. N.S. Wales, vol. xxxi., part 3, p. 467, pl. xxxvi., figs. 1, 2, "Common at 17 to 20 fathoms around Masthead Island, Queensland, on the polyzoan, *Selenaria maculata*, Busk."

Dredged 104 fathoms, 35 miles S.W. of Neptunes, 33 examples; 62 fathoms N.W. of Cape Borda (Verco).

PTEROPODA.

No Pteropods have hitherto been recorded from South Australian waters. The "Challenger," after leaving South Africa, worked in high southern latitudes, then made direct for Melbourne, and dredged thence to Sydney. Several species belonging to this class were thus listed for the Victorian and New South Wales coasts, but none for South Australia. My dredgings during the last few years off the shores of South Australia have yielded seven species of Pteropods belonging to three different genera. The shallowest water in which they were taken was sixty-two fathoms. They were found at all intermediate depths down to 300 fathoms, which was the limit of my operations. No specimens were taken alive, but only their glass-like shells. I am indebted to Mr. C. Hedley, F.L.S., for their identification. "The Challenger Reports, vols. xix. and xxiii."; and "The Catalogue of Marine Shells of Australia and Tasmania, pt. 2, Pteropoda, by John Brazier, C.M.Z.S., F.L.S., Australian Museum, Sydney (Catalogue No. 15), 1892," will supply the synonymy of the species and their habitat.

Family LIMACINIDÆ, Gray.

Genus Limacina, Cuvier.

L. inflata, D'Orbigny.

Atlanta inflata, d'Orbigny, Voyage dans l'Amerique méridionale, vol. v., p. 174, pl. xii., figs. 16, 19, 1836.

Station.—62 fathoms, N.W. of Cape Borda, several; 104 fathoms, S.W. of Neptune Islands, many.

Family CAVOLINIIDÆ, D'Orbigny.

Genus Cavolina, Abildgaard.

C. trispinosa, Lesueur.

Hyalœa trispinosa, Lesueur, M.S., in de Blainville, Hyale, Dict. d. Sci. Nat., vol. xxii., p. 82, 1821.

Stations.—90 fathoms, off Cape Jaffa, 5 examples, 300 fathoms 10; 100 fathoms off Beachport 1, 110 fathoms several, 150 fathoms 2; 104 fathoms off the Neptunes, many.

C. tridentata, Forskäl.

Anomia tridentata, Forskäl, Descriptiones animalium quæ in itinere orientali observavit, p. 124, 1773.

Stations.—Off Beachport, 110 fathoms, several broken, 150 fathoms, 2 broken; off Cape Jaffa, 130 and 300 fathoms, at each one whole and a few broken; off the Neptunes, 104 fathoms, 2.

C. inflexa, Lesueur.

Hyalœa inflexa, Lesueur, Memoire sur quelques amimaux mollusques, etc., Nouv. Bull. Soc. Philom., vol. iii., p. 285, pl. iii., fig. 3, 1813.

Station.—Off Neptunes, 104 fathoms, 1.

Family CLIIDÆ.

Genus Clio, Browne.

C. subula, Quoy & Gaimard.

Cleodora subula, Quoy & Gaimard, Observations Zoologiques faites à bord de l'Astrolabe, Ann. d. Sci. Nat., Ser. 1, vol. x., p. 223, pl. viii., D, figs. 1, 3, 1827.

Stations.—62 fathoms, N.W. of Cape Borda, many; 104 fathoms, 35 miles S.W. of Neptunes, many; 130 fathoms, off Cape Jaffa, 6; 300 fathoms, off Cape Jaffa, very many.

C. pyramidata, Linné.

Clio pyramidata, Linné, Systema Naturæ, Ed. 12, p. 1094, 1767.

Stations.—90, 130, and 300 fathoms, off Cape Jaffa; 104 fathoms, 35 miles S.W. of Neptunes.

C. balantium, Rang.

Cleodora balantium, Rang, Magasin de Zoologie, 1834, pl. xliv.

Stations.—110 and 150 fathoms, off Beachport, several fragmentary; 130 and 200 fathoms, off Cape Jaffa, several fragmentary.

PELECYPODA.

Family CRASSATELLITIDÆ.

Genus Cyamiomactra, Bernard.

C. mactroides, Tate & May.

Cyamium mactroides, Tate & May, Trans. Roy. Soc. South Austr., 1900, vol. xxiv., p. 102. *Type locality*, Tasmania (W. F. Petterd); Tate & May, Proc. Linn. Soc. N.S. Wales, 1901, vol. xxvi., part 3, p. 433, pl. xxvii., fig. 103.

Cyamiomactra mactroides, Tate & May, Hedley, Proc. Linn. Soc. N.S. Wales, 1905 (1906), vol. xxx., part 4, p. 541, pl. xxxi., figs. 9, 10, giving variations, figuring shell and hinge, and supplying additional localities, Victoria, N.S. Wales, and Queensland.

Taken in great numbers, alive and dead, in deep water, St. Vincent and Spencer Gulfs (Verco).

C. communis, Hedley.

Cyamiomactra communis, Hedley, Proc. Linn. Soc. N.S. Wales, 1905 (1906), vol. xxx., p. 541, pl. xxxi., figs. 11, 12, 13. *Type locality*—Manly Beach, near Sydney (Miss L. Parkes), Port Fairy, Victoria (Whan).

Found in numbers in shell-sand at MacDonnell Bay, and at Guichen Bay (Verco).

Genus Cuna, Hedley, 1902.

Cuna delta, Tate & May.

Carditella delta, Tate & May, Trans. Roy. Soc., S. Austr., vol. xxiv., 1900, p. 102. *Type locality*—Derwent Estuary, Tasmania (W. L. May); **Hedley, Records Austr. Mus.**, vol. iv., No. 1, 1901, p. 23, figs. 5a, b, dredged off N.S. Wales, in 35 fathoms; Tate and May, Proc. Linn. Soc. N.S. Wales, vol. xxvi., 1901, p. 434, pl. xxvii., figs. 100, 101; *Cuna delta*, Tate & May, sp., Hedley, Memoirs Austr. Mus., vol. iv., part 5, 1902, p. 316.

Dredged in deep water, St. Vincent Gulf and Backstairs Passage, several alive and dead (Verco); Aldinga (Kimber).

C. concentrica, Hedley.

Cuna concentrica, Hedley, Memoirs Austr. Mus., vol. iv., 1902, p. 315, fig. 55. *Type locality*—Port Kembla, 63-75 fathoms; Hedley, Records Austr. Mus., vol. vi., part 2, 1905, p. 42, 111 fathoms, off N.S. Wales.

Dredged in 20 fathoms, Backstairs Passage, many examples (Verco).

Family CONDYLOCARDIIDÆ, Bernard.

Genus Condylocardia, Bernard.

C. ovata, Hedley.

Condylocardia ovata, Hedley, Proc. Linn. Soc. N.S. Wales, 1905, part iv., vol. xxx., p. 539, pl. xxxi., figs. 5, 6. *Type locality*—Manly Beach, in shell sand (Miss L. Parkes).

St. Vincent Gulf, deep water, many complete and valves (Verco); identified by Hedley from his type.

C. trifoliata, Hedley.

Condylocardia trifoliata, Hedley, Moll. Masthead Reef, Queensland, part 1, Proc. Linn. Soc. N.S. Wales, 1906, vol. xxxi., part 3, p. 475, pl. xxxvii., figs. 20 to 23. *Type loc.*—Several alive from 17-20 fathoms. Also Middle Harbour, Sydney.

Many were obtained by me some years ago in dredge-siftings from Backstairs Passage and St. Vincent Gulf. Though so minute, less than $1\frac{1}{2}$ mm., the young shells may be found within them.

Family VENERIDÆ.

Genus Gafrarium (Circe).

G. angasi, Smith.

Gouldia australis, Angas, Proc. Zool. Soc. Lond., 1865, p. 459; 1867, p. 928.

Circe australis, Angas, Smith, *op. cit.*, 1881, p. 491.

Circe angasi, Smith, Challenger Reports, Zool., vol. xiii., 1885, p. 148, pl. ii., figs. 4 to 4*e*. *Hab.*—Port Jackson, N.S. Wales, 2 to 10 fathoms.

Gafrarium angasi, Smith, Hedley, Moll. of Masthead Reef, Queensland, Proc. Linn. Soc. N.S. Wales, 1906, vol. xxxi., p. 466.

Dredged alive at 17 fathoms, St. Vincent Gulf and Backstairs Passage, 4; at 18 fathoms, Investigator Straits, one example; at 45 fathoms, east of Neptune Islands, 1, and 4 valves; at 17 and 22 fathoms, many valves; in Spencer Gulf, unrecorded depth, 1 alive, and 6 valves (Verco).

Var.—Only one individual of a pale tint has the typical radial rays; most shells are of a pinkish chestnut, especially at the umbos, disposed in dark and light concentric bands; some are deep reddish-brown at the umbos and along the post-dorsal and ventral margins, and have no concentric bands; others are white.

The Ionisation Curve of Methane.

By W. H. Bragg, M.A., F.R.S., Elder Professor of Mathematics and Physics in the University of Adelaide, and W. T. Cooke, D.Sc.

[Read June 4, 1907.]

It has been shown by one of us (Bragg, Phil. Mag., April, 1907) that the loss of energy experienced by the α particle in crossing an atom depends, in some cases at least, on the speed of the particle. When the atom is a heavy one there is rather more loss of energy at the higher speeds. This is true of aluminium, tin, silver, and gold, in comparison with each other and with air.

It was of some importance to determine whether the principle extended to gases also, and the great difference between the weights of the N and O atoms, on the one hand, and the H atom on the other, seemed likely to furnish a good opportunity of settling the question. The ranges of the various α particles in hydrogen itself were too long for the apparatus at our disposal. We therefore prepared some methane (CH_4), since this gas contains a large proportion of hydrogen, and has a convenient stopping-power. The details of the preparation are given below.

The accompanying figure shows the curve which was obtained as the result of the experiment. An air curve is also drawn in the figure so as to make it easy to compare the various ranges in the two gases. The pressure and temperature of the air were adjusted so that the ranges of the α particle from radium itself were the same in both.

It will be seen that the ranges of the other three α particles do not quite correspond. The more energetic particles go further in methane than in air: thus showing that the ratio of the stopping-power of methane to that of air increases somewhat as the speed of the particle diminishes. In other words, fast α particles are less stopped by methane than slow ones, if air is taken as the standard of comparison. This result agrees with, and is an extension of, the principle established in the paper already quoted.

It is interesting to see that, as a consequence, the four steps of the ionisation curve are more clearly shown in methane than in air; in particular, the portions due to RaA and the emanation are very well separated.

The stopping-power of methane, compared to air, is ·860 for RaC and ·880 for RaA. This seems to show that the stopping-power of H is rather lower than the value previously given: but the exact determination depends on the value adopted for the carbon atom, which is at present the subject of investigation.

The total ionisation in methane was found to be 1·165 times greater than in air. Initial recombination effects were small, probably less than in air; experiments on this point are not yet complete.

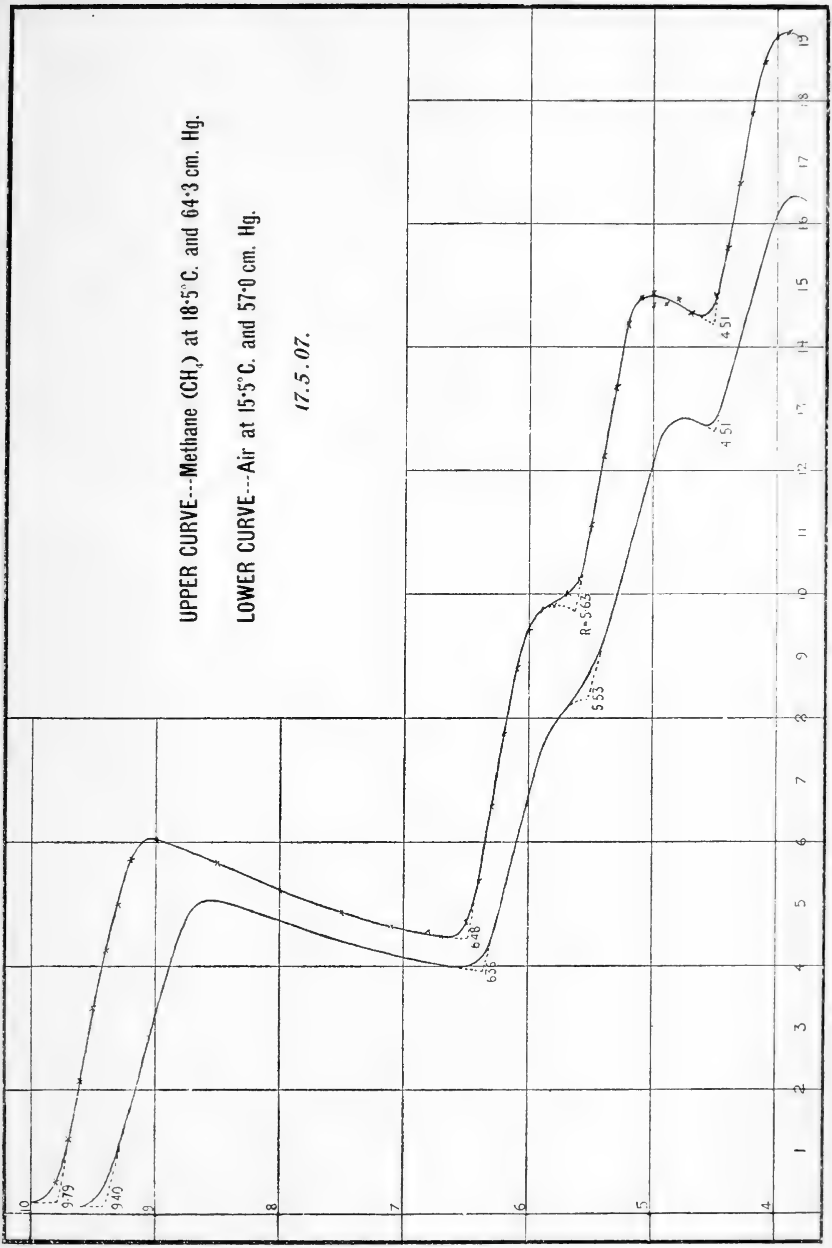
Preparation of the Methane.

The gas was prepared by acting on an aluminium-mercury couple with a mixture of methyl alcohol and methyl iodide, following the directions of Bone and Wheeler (J.C.S., Trans. 1902, 541). These authors freed the methane from the hydrogen present as an impurity by passing the gases over "oxidized" palladium warmed to 100° C. Charitschkaff, however, states (J.C.S., A ii., 1903, 186) that when a mixture of hydrogen and methane is passed over palladinized asbestos not only does the hydrogen burn, but also some methane.

In our experiment the gases issuing from the generator were passed first through two vessels immersed in alcohol which had been cooled to its freezing-point, roughly 160° T. This cooling served to condense the vapours of iodide and alcohol, and to remove also any higher hydrocarbons which might have been formed.

The mixture of methane and hydrogen passed secondly through two vessels cooled in liquid air. In these vessels the methane condensed to a colourless liquid, while the hydrogen passed on and was neglected.

After sufficient methane had liquefied, communication between the first and second pair of cooling vessels was cut off, and the methane allowed to evaporate into a mercury gasholder. The methane was then recondensed as far as possible by again cooling the vessels in liquid air. Part of the methane was then allowed to evaporate into the gasholder, and the gas coming off was pumped away. This partial evaporation was repeated, and a second portion of gas removed. In this way the hydrogen remaining in the connecting tubes, or dissolved in the methane, was removed. The methane remaining showed a vapour pressure of about 150 mm. of mercury. As far as can be gathered from the figures available, this pressure corresponds to that given by methane at the temperature of liquid air, say 90° T. Evidently the gas was quite pure. A determination of its density gave the value ·552, taking air as unity. This figure is almost identical with the calculated value, which is ·553.


UPPER CURVE---Methane (CH_4) at 18·5°C. and 64·3 cm. Hg.
LOWER CURVE---Air at 15·5°C. and 57·0 cm. Hg.
17.5.07.
9.79
9.40
6.48
6.36
R=5.63
5.53
4.51
4.51

New Species and Genera of Australian Lepidoptera.—No. XXIII.

By Oswald B. Lower, F.Z.S., F.E.S., etc.

[Read May 7, 1907.]

TINEINA.

ŒCOPHORIDÆ.

Eochrois leiochroa, n. sp.

Male, 18 mm. Head, palpi, antennæ, and thorax dull white, patagia ochreous. Abdomen greyish-ochreous. Legs whitish, posterior pair ochreous. Forewings elongate, moderate, costa gently arched, apex pointed, termen gently bowed; pale ochreous, minutely irrorated with fuscous; a broad fuscous supra median streak from base to apex, edges suffused; ground-colour between upper edge and costa somewhat orange tinted, especially on basal third; cilia pale orange-yellow, terminal edge blackish. Hindwings grey; cilia grey-ochreous, becoming yellowish at base.

Townsville, Queensland. Two specimens; in October. (Dodd.)

Eochrois trisema, n. sp.

Female, 20 mm. Head, palpi, antennæ, and thorax yellowish. Abdomen greyish. Legs dull whitish. Forewings elongate, moderate, costa gently arched, apex obtuse, termen oblique; pale yellow, somewhat mixed with fuscous, sometimes clear yellow; markings obscure, formed by coalescence of fuscous; 3 spots at $\frac{1}{4}$, middle, and end of cell; sometimes first two absent; apical area of wing darker than rest. Cilia ochreous-fuscous. Hindwings pale grey or greyish-ochreous; cilia ochreous.

Mackay, Queensland. One specimen; without date.

Eulechria paraleuca, n. sp.

Female, 28 mm. Head, palpi, and thorax dull white. Abdomen greyish-ochreous. Legs whitish, posterior pair yellowish. Forewings elongate, costa gently arched, apex rounded, termen obliquely rounded; white, faintly suffused with fuscous, leaving costal edge clear white; a black dot in disc at $\frac{1}{3}$; a second, elongate, below and slightly beyond; a third resting on upper edge of cell beyond middle; a suffused fuscous spot at posterior end of cell, veins towards termen more or less outlined with fuscous; cilia yellow.

Hoyleton, South Australia; Broken Hill, New South Wales. In November.

One of the long-winged species, recalling *Nephogenes* in general appearance.

EULECHRIA MONODA, n. sp.

Female, 19 mm. Head, palpi, antennæ, and thorax fuscous. Abdomen and legs fuscous. Forewings elongate, moderate, costa gently arched, termen oblique; whitish, mixed with grey, markings obsolete in most specimens, but where distinguishable consist of a fuscous spot at $\frac{1}{3}$, a second just above, and two others at end of cell, sometimes confluent; cilia greyish. Hindwings greyish, tinged with ochreous; cilia grey.

North Queensland. One specimen; taken in December.

ŒNOCHRODES, n. g.

Head with appressed hairs, sidetufts moderate. Antennal ciliation 1, moderately and evenly ciliated, with pecten. Palpi moderate, second joint nearly reaching base of antennæ, roughly haired, but not forming a definite tuft. Thorax with a moderate posterior crest. Forewings elongate, moderate, vein 7 and 8 stalked, 7 to apex, 2 almost from angle of cell. Hindwings about 1, 3 and 4 widely remote at origin. Hairs of posterior tibiæ very long. Near *Œnochroa*, Meyr., to which it is somewhat allied by the remoteness of veins 3 and 4 of hindwings, and from *Eulechria* by the tufted thorax; some species of *Eulechria* have veins 3 and 4 of hindwings tolerably remote at origin, at all events not stalked, but this character often occurs in the same species, in fact, in one specimen of *E. œdoxella* I have, one wing has 3 and 4 stalked and remote at origin in the other.

ŒNOCHRODES CROSSOXANTHA, n. sp.

Female, 22 m.m. Head, palpi, antennæ, and thorax ashy-grey-fuscous. Legs fuscous, posterior pair yellow. Forewings elongate, moderate, costa gently arched, ashy-grey-whitish, mixed with fine fuscous scales; markings black; a dot on fold at $\frac{1}{3}$ from base; a second, just above and slightly before; a third in middle, lying on upper edge of cell; a curved somewhat lunate mark at end of cell; a moderate thick line from costa at $\frac{5}{6}$ to dorsum at $\frac{5}{6}$ indented beneath costa, thence curved to termination, where it becomes more distinct; a suffused row of marks along termen; cilia ashy-grey-whitish. Hindwings rather pointed at apex; light fuscous; cilia yellow.

Male, 20 mm. Head, palpi, antennæ, legs, and thorax dark fuscous, posterior legs as in female. Antennal ciliations 1. Forewings shaped as in female; dark fuscous with a few dull whitish scales; all markings obscured through general ground-colour; cilia grey-whitish, at base thickly sprinkled with fuscous. Hindwings as in female.

Hoyleton, South Australia. Four specimens; in December.

NEPHOGENES DROSERODES, n. sp.

Female, 20 mm. Head, palpi, antennæ, thorax, and abdomen dark fuscous, head and thorax minutely sprinkled with whitish. Legs dark fuscous, anterior and middle coxæ sprinkled with whitish scales. Forewings elongate, moderate, costa gently arched, termen obliquely rounded; dark fuscous, minutely irrorated with whitish scales throughout; markings black, rather obscure; a moderately large fascia-like spot from just beneath costa before middle reaching to just beyond fold; a moderate erect spot from anal angle, reaching $\frac{2}{3}$ across wing, broadest at base; a spot on costa at $\frac{4}{5}$, from which is emitted a curved mark which meets previous spot at anal angle; cilia dark fuscous, mixed with darker and with a few whitish points. Hindwings and cilia dark fuscous, somewhat bronzy-tinged.

Broken Hill, New South Wales. One specimen; in August.

NEPHOGENES DRYMELANTHES, n. sp.

Male, 14 mm. Head and thorax white. Palpi and antennæ whitish, second joint of palpi fuscous externally. Abdomen greyish, legs fuscous, posterior pair whitish. Forewings elongate, moderate, costa gently arched, termen obliquely rounded; white suffused on margins with pale fuscous, and with ochreous fuscous markings; a moderately large spot on fold, from base to quarter a small spot at posterior extremity of this, almost confluent; an irregular ovoid spot in posterior end of cell, nearly confluent with previous spot; a round spot just beyond end of cell, from which proceeds a curved series of dots going towards termen, forming a more or less irregular indistinct ovate mark; a spot at anal angle; cilia grey-whitish. Hindwings and cilia grey.

Broken Hill, New South Wales. Two specimens; in April.

NEPHOGENES PYCNODA, n. sp.

Male, female, 20-28 mm. Head, palpi, thorax, antennæ, and legs ashy-grey-whitish, posterior legs greyish. Abdomen dull ochreous-grey. Forewings rather broad, costa gently arched, apex rounded, termen obliquely rounded; ashy-grey-whitish; markings dark fuscous; an obscure mark and costa near base, more or less continued to dorsum; a double dot, transversely placed, sometimes confluent at end of cell; a spot on upper edge of cell; a similar one, in a line with previous dots, at extremity; lower and posterior edge of cell outlined with dark fuscous, sometimes divided into three elongate spots; a line from $\frac{5}{6}$ costa to dorsum before anal angle, indented beneath costa, thence curved around to termination; a row of obscure spots along termen; cilia ashy-grey-whitish. Hindwings greyish-ochreous; cilia greyish-ochreous, with a fuscous sub-basal line.

North Queensland. Two specimens; in October.

NEPHOGENES AMPHISEMA, n. sp.

Male, 18 mm. Head, palpi, antennæ, and thorax ashy-grey-fuscous. Abdomen and legs greyish. Forewings elongate, moderate. Costa gently arched, termen rounded, oblique; ashy-grey-whitish; a small elongate black spot on fold in middle; a similar one above and beyond, and a third in middle of wing at $\frac{2}{3}$, each dot surrounded by an irregular ring of dull whitish in the first two, more or less confluent; in the third, becoming somewhat fascia-like; cilia dull fuscous. Hindwings and cilia fuscous.

North Queensland. Several specimens; in December; frequenting grass.

PHILOBOTA DASYCOPA, n. sp.

Female, 15 mm. Head and palpi white. Thorax fuscous, patagia. Antennæ fuscous. Abdomen ochreous. Legs ochreous, anterior pair fuscous. Forewings elongate, moderate, costa gently arched, termen rounded, oblique; white, with fuscous markings; an S-shaped mark, commencing from dorsum near base, thence curved up towards costa and around to fold at $\frac{1}{4}$, and continued along it for a short distance, and curved up at extremity, whence it meets a broad, irregular-edged lighter fuscous transverse fascia, whitish-edged, from costa at $\frac{2}{3}$ to dorsum at anal angle; a short, inwardly oblique, transverse fascia from costa at $\frac{5}{6}$ to termen at anal angle, with a darker fuscous spot on its anterior edge above middle; cilia white, with a broad fuscous tooth below middle. Hindwings greyish-fuscous; cilia greyish-ochreous, fuscous tinged at base.

MacDonnell Bay, South Australia. One specimen; in December.

PHILOBOTA SPHENOLEUCA, n. sp.

Male, 20 mm. Head snow-white. Palpi fuscous, termination of second joint white. Antennæ fuscous, faintly irrorated with white. Thorax whitish, patagia brownish. Legs fuscous, sprinkled with whitish; posterior tibiæ ochreous. Abdomen dull whitish. Forewings elongate, moderate, costa gently arched, termen oblique; white, becoming broadly fuscous along dorsum; markings fuscous; a well-marked streak from costa at base, continued along fold to near middle, with a sharp projection near costa; a lunate mark at posterior extremity of streak, almost confluent with it; a thick suffused streak along costa from $\frac{1}{6}$ to $\frac{3}{4}$, both extremities pointed; a strong, inwardly oblique streak from $\frac{5}{6}$ costa to beyond middle of wing, preceded above middle by a minute black dot: wing beyond this irrorated with fuscous; a suffused row of dots along termen; cilia greyish-ochreous. Hindwings greyish; cilia pale greyish ochreous, with a fuscous basal line.

Balaklava, South Australia. One specimen; in September.

Cæsyra platyxantha, n. sp.

Male, female, 12-14 mm. Head yellow. Thorax dark coppery-fuscous. Palpi pale ochreous. Antennæ dark fuscous, faintly annulated with whitish. Abdomen and legs dark fuscous, posterior pair mixed with ochreous. Forewings elongate, moderate, costa gently arched, termen oblique, slightly bowed; bright yellow; a dark purplish basal patch, hardly reaching dorsum, very shortly continued along costa; a broad bright reddish-purple band along termen, anteriorly edged with a waved nearly straight line, posterior edge with a fuscous suffusion at apex; cilia bright yellow, becoming fuscous at tornus. Hindwings bronzy-fuscous; cilia fuscous.

Perth, Western Australia. Three specimens in November (Addis).

Ocystola agramma.

Female, 10 m.m. Head, palpi, antennæ, thorax, abdomen, and legs whitish-ochreous. Forewings elongate, rather narrow, termen very oblique; pale whitish ochreous, without markings; cilia pale whitish-ochreous. Hindwings pale grey-whitish; cilia grey-whitish.

North Queensland. One specimen; in December.

Blastobasis anthoptera, n. sp.

Male, 12 mm. Head, palpi, and thorax pale ochreous. Abdomen and legs pale ochreous. Forewings elongate, moderate, costa nearly straight; apex round-pointed; pale ochreous, markings fuscous; a mark at base on costa; a minute dot in middle of wing; two small spots, placed one above the other, beyond posterior extremity of cell; a row of elongate marks along termen and apical fifth of costa; cilia pale ochreous. Hindwings ochreous-fuscous; cilia grey, with a pale fuscous sub-basal line.

Townsville, Queensland. One specimen; at light.

Blastobasis monozona, n. sp.

Male, 12 mm. Head, palpi, and thorax fuscous. Abdomen and legs grey, segmental margins of abdomen dull silvery-white. Forewings elongate moderate, costa hardly arched, apex pointed; light fuscous, with a few whitish scales; a short fuscous basal fascia; an irregular fuscous fascia from just beyond $\frac{1}{3}$ costa to dorsum at $\frac{1}{3}$, internally edged by its own width of white; ground colour between this and base ochreous-tinged; a row of fuscous dots along termen and apical fifth of costa; cilia fuscous. Slightly ochreous-tinged at base. Hindwings light ochreous; cilia greyish, base ochreous-grey.

North Queensland. One specimen; in December.

Mineralogical Notes.

By D. Mawson, B.E., B.Sc.

[Read May 7, 1907.]

Plate XXI.

Contents.

I. Barytes Sand Crystals.

Crystalline sandy nodules occur shoaded on the surface above the cliffs immediately north of Hallett Cove. Their occurrence has long been known, though their composition is generally stated in local collections as "pseudomorphs after selenite."

On first encountering these crystals, the author was struck by their high specific gravity; chemical tests were therefore instituted, and an analysis showed a typical individual to contain approximately 35 per cent. of barium sulphate.

Further investigations revealed its presence, as optically continuous barytes, cementing the remaining 65 per cent., which is composed of ordinary sand grains. Calcium sulphate was found present only in negligibly small quantity.

The aggregates prove, therefore, to be "barytes sand crystals," analogous to the well-known "calcite sand crystals" from Indian Reserve, United States of America.

The exact location of the occurrence is above the cliffs at Black Point, and for some eight chains northward, following near the lower margin of the Miocene limestone. A very complete geological section at Black Point is detailed in one of the Aust. Ass. Adv. Science Glacial Research Committee Reports.[1] A considerable thickness of alternating rusty and yellowish sandy, and chocolate and reddish shaly beds are there shown to compose the upward extension of the Permo-

(1) Pl. i., — Brisbane, 1895.

carboniferous glacial beds, and to be overlain unconformably by the Miocene sandy limestone.

It is in one of the uppermost yellowish sandy horizons of the glacial beds that the barytes sand crystals occur. The particular bed is only a few inches in thickness, and weathers into soft, friable sand-rock, with hard nodular barytes aggregates distributed plentifully throughout.

Specimens were collected from the associated beds, and tested for sulphate. Contrary to expectation, none was found present, though other characters of the beds are evidence of their epirogenic formation under arid conditions; possibly gypsum was present formerly and has since been removed.

Several of the sandy beds were found to be firmly cemented by a calcite cement in optical continuity, and represent, therefore, a massive form of *Fontainebleau Sandstone.*

The typical form of the "barytes sand crystals" is in bunched aggregates averaging 3 cms. diameter. Various intermediate stages are well represented. Sharp crystal edges are never developed, even on specimens collected *in situ.* Single individuals are flat, tabular forms, with edges rounded. Divergent groups of three or four individuals, having the *b* axis in common, are most usual (c.f. pl. xxi. fig. 3.) In cases where a large number have thus grown together, especially when, as in more complicated groups, cross-growths enter into the aggregate, the fully-developed form, with surface resembling peach-stone corrugations, is produced (c.f. pl. xxi. fig. 4).

II. Radial-Nodular Barytes.

Specimens of an unusual form of Barytes collected in the Brighton Lower-Cambrian limestone quarries were, several years ago, presented to the University by Professor E. H. Rennie.

The barytes nodules are as much as 12 cms. in diameter, with a somewhat irregular smooth exterior, occasionally marked by growth lines; interiorly, a radial arrangement is evidenced. The mineral is dark-brown in colour, transparent, and has a vitreous lustre; hardness, about 3·2; fracture, conchoidal.

Some of the specimens pass outwards into a yellowish-white opaque radial curvilaminar form, with silky lustre. A qualitative analysis showed the mineral to be nearly pure barytes.

III. Gypsum from Southern Yorke Peninsula.

Three varieties of gypsum are found genetically connected with the salt lakes of Southern Yorke Peninsula. The following details concerning these occurrences may be of interest, as they have not previously been accorded their importance in scientific literature.

Crystal Gypsum.—Gypsum is found in large clear tabular forms, as much as three inches in diameter, very generally occurring in the saline mud below the salt crust of the lakes. The individuals are often separate and are well-formed. The {111} form is always well-developed, and the crystal closed by uneven planes, approximately in the position of the {001} form. No other faces were observed. The individuals are therefore much flattened in the vertical direction. They occur set in the mud, with the tabular dimensions fairly regularly horizontal. The specimens examined contain only slight inclusions of foreign matter.

Seed Gypsum.—What is locally designated by this name attains a wonderful development, notably along the south side of Lake Fowler. There, some distance in from the original lake boundary, an immense dune about one mile in length, and as much as 30 feet in height and 50 yards in breadth, is formed exclusively of this substance.

The grains are seed-like, and average 0·25 cm. long, and about one-third of this amount in diameter. Only sufficient impurity is present to impart to it a slight yellowish tint. The whole mass, throughout the dune, is readily friable. Scant vegetation exists along the ridge.

With regard to the origin of this deposit, it must, undoubtedly, have been heaped up by hot dry northerly summer winds, sweeping before them the small particles, chiefly cleavage fragments, of gypsum from off the saline crust of the lake.

"Decompo."—The third variety forms a surface zone over the seed gypsum; it is much whiter than the latter, and is in the form of an extremely finely-crystalline powder. Qualitatively tested, it proved to be composed of calcium sulphate, with a very small quantity of calcium carbonate admixed. The local term is a contraction of decomposed, as it is regarded to have originated from the decomposition of other forms of gypsum.

Correctly speaking, this is not a decomposition product, but has resulted from solution and re-precipitation of previously-existing gypsum by surface percolating waters. This explanation accounts for the widely-varying thickness of the zone, from a few inches to several feet and even more where an easy passage for descending waters has been available.

Though the present market does not allow of more than desultory exploitation of the Yorke Peninsula gypsum, these enormous deposits, conveniently situated and easily won, must ever be an increasingly valuable asset to the State.

IV. Gypsum from the Patawalonga Creek.

Several years ago Mr. W. Howchin [2] exhibited crystals of gypsum from a locality near Glenelg. The following are additional remarks on material collected recently, during a combined visit to that locality. The spot is about one mile beyond the Patawalonga Creek, and close to the Glenelg to Reedbeds Road. The ground is there low-lying, elevated only a few feet above sea-level, and consequently swampy in wet weather. Gypsum crystals are met with abundantly, set in the soil a few inches below the surface. Deeper down, they are interwoven together, and set in a shelly mud, evidently a recently raised estuarine mud-bank.

We excavated to a depth of about 3 feet, and the gypsum formation was there as well developed as above.

The specimens saved for examination are, in general, bunched aggregates of interpenetrating tabular crystal masses; the units commonly attain lateral dimensions of 12 cms. by 8 cms. There is a marked tendency to radial twinning on the *b* axis. Crystal faces are not defined, but represented by drusy curved outlines. The drusy character of the surface is due to the development of very numerous independent similarly-oriental crystal growths. These latter are of lenticular form, bounded by smooth rounded outlines, and have resulted from the exclusive development and rounding off of the $\{111\}$ and $\{\bar{1}03\}$ forms. Inclusions, usually shells and shell fragments, are abundant. In fact, the major portion of the occurrence exposed varied between gypsum beds containing little residual shell matter, and shell beds with occasional development of enveloping ramifying gypsum crystals; in the latter case the crystallographic continuity is not affected by the foreign shell-matter.

Crystals occurring in the topmost layers, near the surface of the ground, are somewhat differently modified. In this upper zone the matrix is sandy, and almost free from calcium carbonate; foreign included matter in the gypsum consists, therefore, chiefly of sand grains, which may occupy a large bulk in the crystallization. The crystal aggregates themselves are much smaller, more compact, smoother surfaced, and represent simpler combinations.

The simplest individual is identical in character with the lenticular growths contributing the drusy character to the larger crystals already described; they are, however, much larger, some obtained measuring 5 cms. diameter. The lenticular form tends towards a somewhat irregular dumpy bicone. Twinning is almost universal, and frequently a num-

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(2) Trans. Roy. Soc., S. Australia, vol xxvii., pt. ii., p. 311.

ber of twinned individuals combine to form crystal aggregates. Interpenetrant twins on the *a* face are usually developed. Two forms effected by this type of twinning are figured. The flat upper faces appearing in pl. xxi., fig. 1, are of the $\{\bar{1}03\}$ form; the faces below, shown in fig. 1*a*, are of the $\{111\}$ form.

The spiral type (fig. 2) is very commonly occurring; it is the normal type modified by distortion due to unequal lateral development during growth.

The origin of the gypsum is, no doubt, due to the action of soluble sulphates on the calcium carbonate of the shell beds. The topmost horizon in the sandy matrix is thought to owe its location mainly to capillary attraction, due to surface evaporation, drawing the calcium sulphate in solution upward from below.

V. Gypseous Tufa.

Locality, near Grampus Dam, 12 miles south-east of Paratoo siding.

At this spot, on the flat ground stretching towards the bed of the creek, is exposed a surface deposit of white to yellowish friable material, ascertained to be composed of gypsum admixed with a considerable quantity of calcium carbonate. The area covered exceeds an acre, and the depth in places not less than 6 feet.

VI. Amazonstone.

Some fair specimens of amazonstone were recently got at a small copper-mine at Mulga Hill [3] in the Olary district; they do not, however, compare with the better-known material from Broken Hill.

The ore-formation at the locality cited is associated with a coarse granitic pegmatite in highly-metamorphic rocks of the Lower-Cambrian or Pre-Cambrian age.

VII. Stolzite.

Well-crystallized specimens of stolzite occur in vughs in the oxidized portion of a galena lode situated about 17 miles east of Olary, and one mile south of the Luxemburg Mine. The crystals vary in colour from light honey-yellow to somewhat reddish. Molybdic acid was found in the latter variety, indicating an approach towards wulfenite.

VIII. Chrysotile.

Fine specimens of chrysotile, the silky fibrous form of serpentine resembling asbestos, may be obtained in the highly metamorphic Pre-Cambrian (?) marble belt near Tumby Bay, Eyre Peninsula.

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(3) Mulga Hill is some six miles south-east of the Luxemburg Copper-mine.

The best accessible outcrop is on the property of the Port Lincoln Copper-mine, in the hills five miles west-north-west of the township. There the mineral occurs in fissures up to 5 cms. wide, traversing the marble. These chrysotile veins are set in massive yellowish-green serpentine, which grades outwards into the less metamorphosed marble, and evidently, originally, the sites of cracks, probably the effect of shattering by mechanical compression, or possibly arising from contraction consequent on dolomitization and other chemical changes effected in the originally pure limestone.

IX. Wollastonite.

So far as I am aware, this mineral has not previously been recorded from South Australia. It is extensively developed as an alteration product of the ancient marble referred to in the preceding paragraph.

The workings of the Port Lincoln Copper-mine are chiefly confined to a mineralized belt in this marble, and the ore gangue is largely composed of wollastonite.

As the rock is compact, crystals of the calcium-metasilicate cannot be readily isolated; nor does its pure white colour aid in discriminating it amongst other minerals present similar in this respect.

A number of microscope sections prepared of the rock, however, revealed its presence in varying proportions. By judicious selection, masses of almost pure wollastonite rock may be got.

The resistance to weathering offered by wollastonite allows of its ready detection on the exposed surface of the silicated marble, as where it occurs the weathered surface is rough and jagged.

Mineralogical Laboratory,
University of Adelaide.

EXPLANATION OF PLATE XXI.

Fig. 1. A lenticular gypsum twin, as found occurring in the subsoil near Glenelg.

Fig. 1*a*. View of same perpendicular to Fig. 1.

Fig. 2. A spiral twin of gypsum; a common development of preceding type.

Fig. 2*a*. View of same perpendicular to Fig. 2.

Fig. 3. A barytes sand crystal from Hallett Cove. Radial-tabular aggregates composed of sand grains cemented by about 35 per cent. of barytes.

Fig. 3*a*. View of same perpendicular to Fig. 3.

Fig. 4. A barytes sand-crystal as frequently developed at Hallett Cove, produced by multiplication of the number of individuals, contributing to the aggregates, and resulting in an ellipsoidal form, with corrugated surface, resembling a peach-stone.

Fig. 4a. View of same perpendicular to Fig. 4.

Three Species of Orchid hitherto Unrecorded in this State.

By R. S. Rogers, M.A., M.D.

[Read June 4, 1907.]

Plate XXII.

I.—**Thelymitra venosa** (R.Br.).

This orchid was discovered for the first time in South Australia on December 19, 1906, at Myponga, and on the following day at Square Waterhole, by Mrs. R. S. Rogers. So far it has reached me from no other districts. New South Wales is the only Australian habitat mentioned in Von Mueller's "Census" and in Bentham's "Flora Australia," although I have in my collection specimens of this plant collected by W. H. Archer in Tasmania in the early part of last century.

Description.

Height 11 to 30 inches. Stem not robust, and rather sinuous.

Leaf usually about two-thirds length of plant; linear, channelled.

Bracts, two acuminate, and a third subtending each flower.

Flowers 1-5, pediculated: Perianth segments rather thin and veined, especially the inner ones. The outer segments are rather longer than the inner.

Column winged, middle lobe not produced above the anther. Lateral appendages erect, rather blunt, spirally involute, not tufted.

Anther case very protuberant, with bifid apex, which reaches to about the same level as the lateral appendages.

Stigma bicusped.

Found growing in, or on the margin of, water, in swampy country.

II.—**Pterostylis furcata** (Lindl.).

Mr. J. M. Black recently handed to me for identification an orchid collected in January, 1907, near Karatta Station, Kangaroo Island. This proved to be *P. furcata*, a species of which no very satisfactory description seems to exist. I therefore think it advisable to describe this plant with considerable detail, and to produce drawings of plants in my possession collected by R. C. Gunn (Tasmania), and bearing date 5.11.1843. Bentham gives Tasmania as a habitat, and Victoria as a doubtful habitat. In a note he adds: "Some specimens from Plenty Range, F. Mueller, seem referable to this species rather than to *P. cucullata.*"

F. von Mueller regards it as a variety of *P. cucullata.*

Rodway, in his "Flora of Tasmania," seems to have fallen into a curious error in supposing that this species is figured in Hooker's "Flora Tasmanica" as *P. pedunculata.* This figure, with its sessile basal leaves and small flowers, is certainly not meant to represent *P. furcata;* although, on the other hand, it is not a faithful picture of *P. pedunculata.* (The points of differential diagnosis will be dealt with later.) This plant certainly occurs in Victoria, as in January of this year I had forwarded to me several specimens from Cockatoo Creek, near Fern Tree Gully, Victoria.

Botanical Description.

Plant from 6 to 10 inches high.

Basal leaves shortly petiolate; 3-5 in number; ovate to lanceolate-ovate; margin entire.

Bracts large, leaf-like, loosely sheathing. Often 1 inch to $1\frac{1}{2}$ inches long. Usually two or three in number.

Flower solitary, erect; $1\frac{1}{4}$ to $1\frac{1}{2}$ inches long.

Galea markedly beaked.

Lower lip erect, including rather an acute sinus; with long filamentous or narrow linear points embracing the galea, which they exceed in height.

Labellum oblong-linear, rather wider at the base than at the point, which is narrowly obtuse. For the greater part of its length it occupies a vertical position, but is gently recurved in its distal fourth. It is reddish-brown in colour, not twisted, has a raised mesial longitudinal line, and does not protrude through the sinus. Its basal appendage is curved, with a bifid tuft at its extremity.

The *column* is much shorter than the labellum, with a short subulate process from the upper angle of the wing.

The *stigmatic surface* is elliptical, and occupies rather more than the middle third of the column.

Differential Diagnosis.

(a) P. pedunculata (Br.) Basal leaves are wider, more obtuse, and have much longer petioles. Bracts scale-like and closely-sheathing. Flowers much smaller, rarely more than $\frac{3}{4}$-inch long. *Column is longer than labellum.* The labellum is almost elliptical.

(b) P. curta (Br.) Basal leaves larger, much broader, and more obtuse. Bracts larger than in *pedunculata*, but small when compared with *furcata. Inferior sepals acuminate*

and shorter than galea. Labellum always *twisted*, and protruded through sinus. Column at least as long as labellum.

(c) P. cucullata (Br.) Leaves and bracts much larger, more crowded, and sessile. The upper bract is very large, and partially envelopes the flower. *Points of lower sepals acuminate, incurved, and not longer than galea.* Column longer than labellum. Labellum narrow at base, widening into a broad blunt extremity.

P. pedunculata, curta, and *cucullata* begin to bloom in this State in August, and it is unlikely that even the latest blooms will extend into November. They represent three such distinct types that it is difficult to understand how any confusion can have arisen between them and *furcata*, and, in particular, how the latter can have been regarded as a variety of *cucullata.*

(d) P. acuminata (R.Br.) This is a New South Wales species. It blooms in April, after the early rains, and this alone suffices to distinguish it from *furcata.* The bracts are small and sheathing, the lobes of the lower lip are wider and more lanceolate than in *furcata*, and the labellum projects through the sinus.

The time of blooming of *P. furcata* may be placed at November to January.

III.—**Caleana major** (R.Br.).

This species has an interesting history so far as this State is concerned. It was not known to occur here until December, 1901, when a single specimen was discovered by Mr. T. A. Wilson at Mylor. This specimen is now in Mr. Tepper's collection. Although diligent search was made for further examples of this species it was fruitless until the end of November, 1906, when Mr. E. H. Lock found a few more specimens on Mount Lofty. Just a month later a very large number of specimens were collected for me at Dingabledinga (near Willunga) by a resident of that place. It may therefore now be placed confidently among the native orchids of this State.

Description.

Plant varies from 7 to 12 inches high.

Flowers, one or two, reversed, reddish-brown.

Leaf solitary, 2 to 3 inches long, slightly sheathing at the base, narrow-lanceolate, glabrous, generally reddish, with very distinct mid-rib.

Stem green or reddish-brown, wiry, with one tightly-sheathing bract a little above the insertion of the leaf, and another subtending each flower.

Dorsal sepal about $\frac{3}{4}$-inch long, incurved, narrowly concave, lanceolate.

Lateral sepals rather longer than the dorsal, usually slightly divergent, dentate about the middle, beyond which they are narrowly tubular and pointed. Proximal half narrow and channelled.

Lateral petals filiform, rather shorter than dorsal sepal.

Column incurved, almost as long as the dorsal sepal, very widely winged from below the anther. Wings fitted.

Stigmatic surface circular, just below the anther.

The winged column forms a vessel shaped somewhat like an ancient Roman lamp, which is capable of being almost completely closed by the labellum when this is lowered.

The *labellum* is attached to a long semi-circular strap-like claw. It consists of a rather large convex central lobe, about 3 lines in diameter, with a beak-like process looking towards the anther, and a shorter curved process looking towards the insertion of the lateral sepals. It is not so sensitive as the labellum in many of the genus *pterostylis*, but if a slight pressure be applied to the beak when it is in the raised position this will flatten itself against the claw, and the whole apparatus make a slow and deliberate descent so as to form a lid to the winged column.

DESCRIPTION OF PLATE XXII.

A. Pressed specimen from R. C. Gunn's collection of Tasmanian orchids (1843).

B. Shows column *(c)*, labellum *(l)*, anther *(a)*, pencillate appendage of labellum *(ap)*. All natural size.

C. Enlargement (x 3) of B.

Descriptions of Australian Curculionidæ, with Notes on Previously Described Species.

By Arthur M. Lea.

Part V.

[Read July 2, 1907.]

SUB-FAMILY LEPTOPSIDES.

Mandalotus.

Erichson referred this genus to the *Otiorhynchides* near *Tyloderes;* Lacordaire questioned its position there, but as it was unknown to him could not satisfactorily place it, and provisionally placed it at the end of the *Eremnides;* Pascoe referred *Dysostines* (a synonym of *Mandalotus)* to the *Rhyparosomides.* I believe the correct position of the genus to be in the *Leptopsides,* close to *Polyphrades.*

The eyes, the scrobes, and the triangular plate at apex of rostrum are very similar to those of most species of *Polyphrades,* as are also the loose way the four front coxæ are inserted, the shape of the side-pieces of the meso- and metasternum, and the transverse corrugations of the concealed part of the base of the head. The sexes also differ in much the same way.

The peculiar round, flattened granules of the prothorax are much the same as in many species of *Essolithna,* which genus is certainly very close to *Polyphrades.*

Many of the species have also a subtubercular elevation just behind the front coxæ, as in the species of *Leptops* and other genera of the *Leptopsides,* but it is often partially concealed.

The scrobes are slightly variable, but their shape is so often partially concealed by clothing that they cannot be satisfactorily used. Above each scrobe, towards the base, there is usually, if not always, a groove (sublateral sulcus) as in the species of *Leptops,* but this also is partly or entirely concealed by clothing.

The ocular lobes are distinct [1] and are always ciliated, but they are usually not so strong as in *Polyphrades.* The rostrum is slightly longer than in most species of that genus; but apart from this and the entirely free claws of *Mandalotus* it would be often difficult or impossible to distinguish the two genera.

(1) In *pilosus* and *pinguis* these lobes are absent; but, as will be noted below, these species belong to *Timareta.*

The antennæ are seldom of use for description; they differ somewhat in thickness, but the basal joints of the funicle are always longer than the others, and the first nearly always longer than the second; from some directions, however, the second often appears to be longer than, or at least as long as, the first.

The scutellum, when present, is always small, but it is so frequently either quite absent or concealed by scales and mud, that it is not a feature to be relied upon. It sometimes appears to be present, moreover, even when really absent; this being due to scales or mud becoming compacted at its position.

The base of the abdomen appears always to be margined with a row of large punctures, but these are sometimes almost or quite concealed by the clothing.

The front coxæ vary through all gradations from touching to widely separated—a most unusual feature in any genus of weevils. Between them the prosternum is always divided; at the rear of the division (when the coxæ are distinctly separated) the derm is truncate, but in front there is a more or less conical or rounded process touching the truncated part. There is a certain amount of variation in the degree at which the claws diverge; in some the divergence being slight, in others moderate, but they are never either widely divergent or soldered together at the base.

The derm is often entirely concealed by the clothing, so that to see the colour and sculpture it is necessary to partially abrade one or more specimens. The species are also so frequently covered with mud that even the clothing is concealed, and sometimes stained. I have had specimens for hours in water, and been afterwards unable to remove the mud only, as if too rough a brush is used the clothing comes off as well as the mud. The punctures always appear to be much smaller than they really are, and the carina of the rostrum and the median impression of the prothorax are often partly or entirely concealed.

I do not think that any species of this genus should be described unless one or more specimens has been partially abraded. With unique or rare specimens it is not desirable to entirely abrade the surface, but in such cases I have abraded part of the disc of the prothorax and part of the elytra near the suture and base. It is unsafe as a rule to describe species of which only the females are known, but I have described *niger*, as, even if the type specimens are females, they are unusually distinct.

The clothing is often variegated, and the pattern of the variegation is usually, if not always, variable. The colour is often not trustworthy, as many of the species appear to have forms in which the derm (especially of the elytra) may be either black or brown, or even of a livid red.

The sexes are usually well defined, and the genus may be readily divided into three groups depending on male characters: —

1. Male with intercoxal process of mesosternum produced into a laminated or conical process.
2. Male with basal segment of abdomen carinate or tuberculate.
3. Mesosternum and abdomen simple in both sexes.

The elytral punctures are usually much larger in the male than in the female, although before abrasion there is not much apparent difference between them. The male is also usually smaller and narrower; with more strongly curved tibiæ. In many of the species the tibiæ (especially the front pair) are ciliated, but (with the exception of *inusitatus*) only in the male, and in the following descriptions it has not been considered necessary to comment on its absence in the females. The hind tibiæ are sometimes dentate or carinate in the male, but never in the female. Where the front coxæ are distinctly separated, the space between them is usually slightly less in the male than in the female, owing to the slightly greater enlargement of his coxæ.

Many species which at first sight strongly resemble each other are seen to be very distinct when the sexual characters or the space separating the front coxæ are examined. The prothoracic sculpture on abrasion is often very useful in distinguishing apparently closely-allied species.

Few of the species appear to be at all widely distributed; and many of them are to be taken at the roots of beach-growing plants; others occur under logs and stones, and a few under bark.

The following table of species known to me is arranged principally for convenience of identification. With the probable exception of *niger*, it is drawn up exclusively from males; to attempt a table that would include females would, I believe, tend only to confuse instead of assist; for this reason *punctiventris* (of which I have only a female) is not included: —

A. Mesosternum with a laminated intercoxal process.
  a. The process extending to middle of front coxæ ... ... *intercoxalis*, n. sp.
  aa. The process much shorter
    b. Base of process flat ... ... *hoplostethus*, Pasc.
    bb. Base of process convex ... ... *simulator*, n. sp.

AA. Mesosternum with a more or less conical intercoxal process.	
c. Apical half of elytra irregular	*crudus*, Er.
cc. Apical half of elytra regular.	
d. Setæ of upper surface rather dense, long, and thin	*variabilis*, n. sp.
dd. Setæ of upper surface much sparser, shorter, and stouter	*vacillans*, n. sp.
AAA. Mesosternum without a laminated or conical intercoxal process.	
B. Middle of basal segment of abdomen impinging on second	*ventralis*, Blackb.
BB. Middle not so impinging.	
C. Abdomen carinate or tuberculate.	
e. Basal segment of abdomen bituberculate	*geminatus*, n. sp.
ee. Basal segment with a median tubercle	*tuberculiventris*, n. sp.
eee. Basal segment with a longitudinal carina on each side of middle ...	*excavatus*, Lea.
eeee. Basal segment with a transverse or curved apical or subapical carina.	
f. Front coxæ touching	*bryophagus*, n. sp.
ff. Front coxæ feebly separated.	
g. Basal segment of abdomen incurved to middle of apex ...	*Blackburni*, n. sp.
gg. Basal segment straight at apex	*litoralis*, n. sp.
fff. Front coxæ distinctly and usually widely separated.	
h. Elytra tuberculate.	
i. Apex of hind tibiæ suddenly and strongly incurved ...	*longicollis*, n. sp.
ii. Apex almost straight ...	*arciferus*, n. sp.
hh. Elytra non-tuberculate.	
j. Suture with small shining granules.	
k. All segments of abdomen with shining granules ...	*granulatus*, n. sp.
kk. Third and fourth segments without such granules	*carinativentris*. n. sp.
jj. Suture without such granules.	
l. Abdominal carina feebly arched	*imitator*, n. sp.
ll. Abdominal carina strongly arched.	
m. Alternate interstices raised	*Carteri*, n. sp.
mm. Alternate interstices not raised.	
n. Scutellum small and shining	*sabulosus*, n. sp.
nn. Scutellum not traceable	*Sydneyensis*, n. sp.
CC. Abdomen not carinate or tuberculate.	
D. Upper surface glabrous	*glaber*, Blackb.

DD. Upper surface distinctly and usually densely clothed.	
E. Elytra tuberculate.	
o. Hind tibiæ dentate at base ...	*scaber*, Lea.
oo. Hind tibiæ not dentate at base.	
p. Under surface with long pubescence	*mirabilis*, n. sp.
pp. Under surface without such pubescence.	
q. Space between middle coxæ not much more than that between front pair.	
r. Front tibiæ not ciliated	*niger*, n. sp.
rr. Front tibiæ densely ciliated	*Coatesi*, n. sp.
qq. Space between middle coxæ much greater than between front pair	*campylocnemis*, Lea
EE. Elytra non-tuberculate (at least elsewhere than about shoulders).	
F. Prothoracic granules transversely arranged or subcarinate.	
s. Abdomen sparsely clothed ...	*Crawfordi*, Blackb.
ss. Abdomen densely clothed.	
t. Size very small.	
u. Base of elytra gently and regularly emarginate ...	*arcuatus*, n. sp.
uu. Base of elytra trisinuate	*trisinuatus*, n. sp.
tt. Size above average	*setosus*, n. sp.
FF. Prothoracic granules not so arranged.	
G. Scape very stout.	
v. Prothorax with large isolated granules or small tubercles	*nodicollis*, n. sp.
vv. Prothoracic granules not large and isolated ...	*crassicornis*, n. sp.
GG. Scape at most moderately stout.	
H. Hind tibiæ bidentate ...	*Fergusoni*, n. sp.
HH. Hind tibiæ not bidentate.	
I. Prothoracic granules not obscured by clothing.	
w. Basal segment of abdomen with granules ...	*seticollis*, n. sp.
ww. Basal segment without granules	*reticulatus*, Lea.
II. Prothoracic granules partially obscured or absent.	
J. Front coxæ more or less widely separated.	
x. Emargination of apex of prosternum sudden and deep ...	*amplicollis*, Lea.
xx. Emargination not sudden and deep.	
y. Suture between basal segments of abdomen almost obsolete in middle	*sterilis*, Er.?

yy. Suture distinct across middle.
z. Prothorax (on abrasion) with very minute granules on disc.
a. Front tibiæ with long and moderately dense ciliation ... *similis*, n. sp.
aa. Front tibiæ with rather short and feeble ciliation ... ... *ochreonotatus*, n. sp.
zz. Prothorax (on abrasion), with large but almost obsolete granules ... *Blackmorei*, n. sp.
zzz. Prothorax (on abrasion), with distinct granules on disc.
b. Front tibiæ densely ciliated at apex... *piliventris*, Lea.
bb. Front tibiæ feebly ciliated at apex.
c. Base of elytra trisinuate . *humeralis*, n. sp.
cc. Base regularly emarginate.
d. Front tibiæ dentate ... *avenaceus*, n. sp.
dd. Front tibiæ edentate ... *albonotatus*, n. sp.
JJ. Front coxæ not widely separated.
K. Derm nowhere black *pallidus*, Lea.
KK. Derm black, at any rate in parts.
L. Suture (on abrasion) decidedly paler than second interstice ... *suturalis*, Lea.
LL. Suture black or almost so.
M. Front coxæ touching.
e. Club reddish ... *maculatus*, n. sp.
ee. Club black or almost black *inusitatus*, n. sp.

MM. Front coxæ not touching.

N. Length of eyes greater than space between them ... *pusillus*, Lea.

NN. Length less than space beween them.

O. Prothoracic sculpture not entirely concealed before abrasion ... *subglaber*, Lea.

OO. Prothoracic sculpture entirely concealed before abrasion.

P. Hind tibiæ suddenly narrowed about the middle . *cellaris*, Pasc.?

PP. Hind tibiæ not suddenly narrowed there ... *spurcus*, Lea.

Notes on above Table.

eeee. This carina usually, but not always, marks the hinder margin of a flattened space.

ii. Except for the usual inflation of apex.

r. There are the usual setæ on the tibiæ, however.

F. The prothorax has the granules so arranged that there appear to be fine striæ separating them into sub-parallel lines; the arrangement as a rule being fairly easily seen through the clothing, and always distinct on abrasion.

G. In *amplicollis* and several other species the scape is stouter than usual, but in these two it is quite remarkably stout.

v. These can only be seen after abrasion, however.

II. In many of the species the granules are readily traceable, but the clothing usually prevents the granules themselves from being seen.

Excluding *pilosus*, Blackb., and *pinguis*, Lea, which do not belong to the genus, and are referred to below, the following is a list of the species hitherto described:—

crudus, Er.
    rigidus, Er.
sterilis, Er.
    vetulus, Er.
    Dysostines fuligineus, Pasc.
valgus, Pasc. (*Dysostines*).
pilipes, Pasc. (,,).
hoplostethus, Pasc. (,,).
pustulosus, Pasc. (,,).
cellaris, Pasc. (,,).
Crawfordi, Blackb. (,,).
ventralis, Blackb. (,,).
punctiventris, Blackb. (,,).
glaber, Blackb. (,,).
advena, Blackb. (,,).
campylocnemis, Lea.
piliventris, Lea.
scaber, Lea.
amplicollis, Lea.
spurcus, Lea.
excavatus, Lea.
suturalis, Lea.
pallidus, Lea.
reticulatus, Lea.
pusillus, Lea.
subglaber, Lea.

MANDALOTUS STERILIS, Er.

Twelve specimens of a narrow species from Ulverstone (near the original locality in Tasmania) probably belong to this species; they are somewhat variable in markings, as are most species of the genus.

Mr. Blackburn says of the type, "the suture between the first and second ventral segments is extremely fine"; this is the case with my specimens *across* the middle (in fact in some specimens the suture in the very middle seems quite obliterated), but at the sides it is well defined, although not so deep or wide as those of the following segments. This character will readily distinguish it from most species, but in this, and many other characters, it strongly resembles the female of *ventralis*.

The prothoracic granules are traceable to a certain extent through the clothing, and on abrasion are seen to be large, round, and feeble; the elytral punctures in the striæ are (for the genus) decidedly small, being much narrower than the interstices. The degree in which the alternate interstices are raised above their fellows is somewhat variable. The prothorax has a median line, but it is quite concealed normally. The size varies from $4\frac{3}{4}$ to 6 mm.

The sexes are very ill-defined; in some males, however, the front tibiæ are more strongly curved on the apical third, and the basal portion is supplied below with a narrow keel, which sometimes is rather suddenly terminated, but both curvature and keel are not of constant strength, and those of some males are not to be distinguished from some females. In the male also the basal segment of the abdomen has an arcuate apical median space slightly depressed below the basal portion (but not concave).

Mandalotus crudus, Er.

In specimens in good condition the median prothoracic impression is scarcely, or not at all, traceable.

Mandalotus ventralis, Blackb.

Remarkably distinct by the abdomen of the male. I have specimens from King Island and Tasmania, as well as from South Australia (the original locality). The specimens before me vary from dark brown, with pale markings, to almost white, with more or less distinct brown spots.

Mandalotus valgus, Pasc.

In describing *campylocnemis* and *scaber*, I compared them with a species I supposed to be *valgus;* this species, although it closely agrees with the figure of that species, and in many respects with the description, I now find was wrongly identified, and I have described it as *intercoxalis.*

Mandalotus cellaris, Pasc.

Mr. Masters (from whom the types of this species were received) has given me three Sydney females as belonging to this species; they differ, however, from the description in being smaller (only two lines including the rostrum in its normal position), and have not the hind tibiæ "*intus fortiter bisinuatus*" (probably, however, a masculine character). I have also two specimens (sexes) from the Nepean River, belonging to the same species, and of which the male has the hind tibiæ (as seen from the sides) regularly dilated to about the middle, and thence strongly arcuate to the apex: seen directly from above or below also, the apical third appears much narrower than the basal two-thirds. From *spurcus* it differs in having the front coxæ more distant, and the median line less distinct, as well as in the hind tibiæ.

Mandalotus scaber, Lea.

The base of the hind tibiæ of the male of this species has an acute transverse carina, somewhat as in the male of *crudus*, but more acute and much nearer the base.

Mandalotus pilosus, Blackb.

I have a specimen of this species (named by Mr. Blackburn himself, and agreeing with his description) which was somewhat doubtfully referred to *Dysostines.* The ocular lobes are entirely absent, and the front coxæ are contiguous. I refer it, without doubt, to *Timareta.*

Mandalotus pinguis, Lea.

Also now referred to *Timareta,* as in its absence of ocular lobes and contiguous front coxæ it agrees with the preceding, and with *crinita.*

Mandalotus intercoxalis, n. sp.

Male. Blackish, antennæ and parts of legs dull red. Densely clothed with muddy-brown, feebly-variegated scales, the paler ones forming feeble rings on legs. With stout, suberect or decumbent setæ, rather sparse elsewhere than on legs; basal segments of abdomen with finer setæ than elsewhere; front tibiæ with rather fine setæ, but not ciliated.

Rostrum with carina concealed, except at base and apex. Second joint of funicle slightly longer than first. *Prothorax* with a median line and a transverse waved impression, both partially concealed; with minute, scattered, quite-concealed granules. *Elytra* trisinuate at base; with obtuse tubercles, more distinct at summit of posterior declivity than elsewhere; with rows of large round punctures. *Mesosternum* with a laminated process extending to middle of front coxæ. Basal segment of *abdomen* concave. *Legs* stout; front coxæ widely separated; tibiæ curved at apex, especially the front pair. Length $6\frac{1}{4}$ mm.[2]

Hab.—New South Wales: Cooma.

The elytral punctures appear to be considerably narrower than the interstices, but after abrasion they are seen to be almost or fully as wide. The intercoxal process of the mesosternum is twice as long as its greatest width (which is about one-third from the base), is flat, but at the apex slightly turned up, it is narrowed towards the base and towards the apex, but not at the apex itself, and is densely squamose, except at its base; the process of *hoplostethus* is much shorter (not once and one-half as long as wide), strongly curved, and almost glabrous.

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(2) The lengths given are exclusive of the rostrum.

Mandalotus simulator, n. sp.

Male. Black, in places dull red; antennæ and parts of legs reddish. Densely clothed with pale muddy-brown scales, feebly variegated in places with paler and darker scales; legs feebly alternately banded with pale and dark scales. With stout, suberect setæ, varying from pure white to almost black; tibiæ with sparse ciliation in addition to setæ.

Rostrum without visible carina. Two basal joints of funicle equal in length. *Prothorax* feebly transverse, sides strongly rounded, with a distinct median line; with obtuse, quite-concealed granules. *Scutellum* small but distinct. *Elytra* conjointly arcuate at base (but apparently trisinuate from some directions, owing to thickening of the third interstices at base), subtuberculate in places; with rows of large round punctures. *Mesosternum* with a laminated process about as long as wide. *Abdomen* with basal segments flat in middle. *Legs* stout; front coxæ widely separated; front tibiæ strongly curved at apex. Length 4-5¼ mm.

Hab.—New South Wales: Nepean River (A. J. Coates).

So far as it is possible to judge before abrasion, one of the specimens is entirely of a rather pale red or livid yellow, two others appear to have the body entirely dark, except for the tubercular elevations, which are of a rather dull red; the femora of one of these latter are almost black, but in the other they are not much darker than the tibiæ. The elytra appear to have numerous feeble whitish spots in two of the three specimens before me: their setæ are not regularly distributed, and are almost confined to the alternate interstices; the abdomen is not so densely clothed as the upper surface. The elytral punctures appear to be rather small, but on abrasion many are seen to be even wider than the interstices. The intercoxal process of the mesosternum is distinctly shorter than in *hoplostethus*, and convex (instead of flattened) at its base, but then curved round as in that species.

Mandalotus variabilis, n. sp.

Male. Black or dark brown; legs (wholly or in part) and antennæ of a dull red. Densely clothed with muddy or slaty-brown scales, variegated with patches or spots of paler scales. Densely clothed with rather long and fine setæ, depressed on prothorax, suberect on elytra; under-surface and legs with rather dense fine setæ, but with scales very sparse and confined to small spots.

Rostrum with narrow and well-defined carina. Antennæ rather stout. *Prothorax* with strongly-rounded sides, with numerous shining unipunctuate granules. *Scutellum* small but distinct. *Elytra* conjointly arcuate at base, with series of large, almost regular punctures, interstices gently and regularly convex. *Mesosternum* with a briefly conical intercoxal process. *Abdomen* rather densely granulate, two basal segments conjointly concave. *Legs* rather stout; front coxæ moderately separated; tibiæ inflated at apex, and all more or less feebly granulate below. Length 5-5½ (female 5½-7) mm.

Female. Differs in being larger and wider, mesosternum simple, basal segment of abdomen impressed on the apical half of its middle only, the second not at all concave, tibiæ less curved, and the elytral punctures much smaller (before abrasion, however, they appear to be of the same size).

Hab.—Tasmania: Hobart, Nubeena (at roots of beach-growing plants).

The clothing is very variable; on numerous specimens (especially males) it is of a slaty-brown colour, with small but fairly-distinct paler spots; the spots may be confined to the sides and apex, or extend across the disc (both of prothorax and elytra) as well; in some specimens scales are more of a yellowish-brown colour, with (or without) feeble paler spots; the clothing of the head is usually, but not always, paler than on the rostrum. The scales on the prothorax are sparser than on the elytra, but the setæ are considerably denser, although less distinct; the elytral setæ are not confined to alternate interstices. The granules on the prothorax, although usually placed amongst rather dense scales, are quite distinct before abrasion, and each has a central puncture; the median line is usually distinct, but is never deep or wide, occasionally it is partially concealed by the setæ and scales. In the male the punctures in the striæ are not much narrower than the interstices, but in the female they are considerably narrower; in both sexes, however, their size is obscured by the clothing. The mesosternal process is much as in *crudus*, but the abdomen is more decidedly concave, the elytra are entirely without tubercles, and the hind tibiæ are edentate; the clothing also is different.

Mandalotus vacillans, n. sp.

Male. Black; antennæ (scape darker than funicle), tarsi, apex of tibiæ and base of femora of a dull red. Densely clothed with scales varying from almost white to almost black. With moderately stout and not very dense setæ, also variable in colour.

Rostrum with carina distinctly traceable through, but concealed by, clothing; scrobes less curved than usual. Scape strongly dilated towards apex. *Prothorax* with numerous round flattened granules, traceable through, but concealed by, clothing; median line feeble or absent. *Elytra* conjointly arcuate at base; with series of large, round, regular, more or less concealed punctures; fifth interstice with a feeble subtubercular swelling posteriorly. *Mesosternum* with a very obtusely conical intercoxal process. *Abdomen* with basal segments feebly convex in middle. *Legs stout;* front coxæ moderately separated; front tibiæ not strongly curved, the others almost straight. Length $4\frac{1}{4}$ mm.

Hab.—Tasmania: Hobart (A. M. Lea).

I believe the female of this species is before me, but as I am not quite certain of it, it is not further commented upon.

The three apical segments of the abdomen and the coxæ are sometimes of a dull red. On one specimen the scales are almost black, with feeble pale rings on the legs and a few pale spots on the elytra and sides of prothorax. In another the scales on the upper surface are mostly of a dingy white, mottled with pale and dark brown; in another the scales are slaty brown, with numerous pale spots; in others they are muddy brown, with hardly any variegation. Usually there is a feeble stripe on each side of the prothorax. The setæ, although not confined to alternate interstices, are not regularly distributed. Seen from above, the rostrum appears to have three parallel, partially-concealed carinæ. Before abrasion the prothorax appears to be closely covered with fairly large, round, flattened granules; but these on abrasion are seen to be considerably smaller, although not very small. The interstices are scarcely separately convex, and are about the width of the punctures, although, before abrasion, they appear to be much wider. The intercoxal process of the mesosternum is almost rounded and nowhere suddenly lessened in width, and the abdomen is gently convex; one specimen before me, possibly, however, representing a variety or an undescribed species, has the abdomen gently concave along the middle of the two basal segments, these features readily distinguishing it from *crudus* and the preceding species; but in general appearance it has little in common with those species.

Mandalotus geminatus, n. sp.

Male. Blackish; antennæ (scape darker than funicle), legs (parts of femora excepted or not) and apical half of abdomen of a dull red. Densely clothed with soft muddy-brown scales, feebly variegated with paler scales on the shoulders, sides of prothorax, and on head and rostrum; under surface with rather pale scales. With stout subdepressed setæ.

Rostrum without visible carina. Two basal joints of funicle stout and subtriangular. *Prothorax* feebly transverse, sides subangularly dilated near apex; median line very narrow and quite concealed; with rather sparse, minute, feeble granules, not traceable through clothing. *Elytra* elongate-cordate, conjointly arcuate at base, shoulders strongly rounded; with series of large, almost concealed punctures; interstices regular. *Abdomen* with a large granule or small tubercle on each side, near apex of middle of basal segment. *Legs* stout; front coxæ touching; tibiæ not strongly curved. Length, 4 mm.

Female. Differs in being wider, abdomen simple, tibiæ straighter, and elytral punctures smaller.

Hab.—Queensland: Cairns (E. Allen).

The majority of the setæ should perhaps be regarded as scales, as they are much wider than is usually the case with setæ, each also is pale at its tip; on the disc of both prothorax and elytra they are wider than elsewhere, and on the elytra they are arranged in quite regular rows. Before abrasion the elytral punctures appear to be rather small, and many are quite concealed, but after abrasion those of the male are seen to be wider than the interstices, whilst those of the female are usually not as wide as the interstices.

Mandalotus tuberculiventris, n. sp.

Male. Black; antennæ and parts of legs of a dull red. Densely clothed with muddy brown scales, variegated in places (especially on the prothorax) with paler scales. With moderately dense, stout setæ; on the elytra sparser than elsewhere, not regularly distributed, and almost confined to alternate interstices. Tibiæ with rather sparse ciliation.

Rostrum with narrow and usually concealed carina. Scape but slightly dilated towards apex. *Prothorax* with sides strongly rounded; a narrow but deep median line; apparently without granules. *Elytra* conjointly arcuate at base, with rows of large partially-concealed punctures; interstices with tubercular swellings in places, especially about summit of posterior declivity. Basal segment of *abdomen* with a very distinct median tubercle. *Legs* stout; front and middle coxæ widely separated, the separation of about equal width; tibiæ rather strongly curved. Length, 5 mm.

Female. Differs in having the prothorax narrower and elytra wider, abdomen simple, tibiæ less curved, etc.

Hab.—New South Wales: Sydney (A. M. Lea).

The legs are feebly annulated; on the elytra there are usually small dingy whitish spots of scales and setæ; the paler scales of the prothorax are yellowish-brown. On abrasion the prothorax is seen to have no granules on the disc, but rather large and very feeble ones at sides, these being quite concealed normally. Viewed directly from above or below the hind tibiæ appear to be suddenly narrowed from about their middle.

MANDALOTUS BRYOPHAGUS, n. sp.

Male. Blackish; antennæ and legs (wholly or in part) of a rather bright red. Densely clothed with pale muddy brown scales, feebly mottled with paler and darker scales. Setæ pale and moderately numerous.

Rostrum without visible carina. Second joint of funicle very slightly longer than first. *Prothorax* transverse, sides strongly rounded; with numerous rather large, round, flattened granules, concealed by but traceable through clothing; median line absent. *Elytra* trisinuate at base; with rows of large but more or less concealed punctures. *Abdomen* with all the sutures straight, basal segment with a narrow, feebly-curved carina extending across about one-third of, and almost at, the apex. *Legs* stout, front coxæ touching; tibiæ less strongly curved than usual. Length, $3\frac{1}{2}$-$3\frac{3}{4}$ (female, 4-$4\frac{1}{4}$) mm.

Female. Differs in being larger and wider, abdomen more convex and simple, tibiæ straighter, etc.

Hab.—Tasmania: Frankford, Hobart (A. M. Lea).

The scape is usually darker than the funicle, the middle of the femora and of the tibiæ are usually darker than the other parts of those limbs; the apical segments of the abdomen are sometimes reddish. The mottling of the upper surface is usually very slight, but in some specimens the paler or darker scales appear as small distinct spots. On the elytra the setæ, although not confined to the first, third, and fifth interstices, are more conspicuous on those than on the others. On abrasion, the elytral punctures of the male are seen to be very large and round, in places being twice the width of the interstices; in the female they are usually about the width of the interstices. These before abrasion appear to be much wider (in both sexes) than the punctures; in some specimens also they appear to be feebly alternately raised. The trisinuation of the elytra is caused by the third interstice being subtuberculate at base. The suture between the first and second abdominal segments is perfectly straight: a most unusual feature, although not unique in the genus. The carina of the basal segment, although sufficiently distinct, is apt to be partially concealed by the clothing. The seven specimens before me were all taken in moss.

MANDALOTUS BLACKBURNI, n. sp.

Male. Black; funicle, club, and tarsi reddish. Densely clothed with dark slaty-brown or sooty-brown scales, somewhat paler on undersurface; legs feebly or not at all annulated. With rather dense stout setæ.

Rostrum with a narrow carina, concealed by but distinctly traceable through clothing. Scape moderately but regularly dilated to apex. *Prothorax* feebly transverse, sides strongly and regularly rounded; with numerous rather large, round, flattened granules, densely clothed but readily traceable; median line feeble and sometimes absent. *Elytra* with the regular emargination of base slightly interrupted by the third interstices; with rows of large, round, partially-concealed punctures, alternate interstices very feebly raised, suture and usually the third with minute shining (but sometimes quite concealed) granules. *Abdomen* with small more or less concealed granules; basal segment at apex incurved to middle, with a distinct shining slightly-curved carina near apex, and about one-third the width of apex. *Legs* very stout; front coxæ feebly separated; tibiæ rather feebly curved, the front pair feebly denticulate below. Length, $4\frac{1}{2}$-5 (female, $4\frac{1}{4}$-$5\frac{1}{2}$) mm.

Female. Differs in having the prothorax narrower and elytra wider, punctures smaller, abdomen more convex and simple and tibiæ straighter.

Hab.—Tasmania: Hobart, Launceston, Stonor, Jordan River (A. M. Lea).

The clothing is occasionally feebly mottled, and in some specimens the alternate interstices are slightly paler than the others. On the upper surface the setæ are usually dark, but on the elytra many of them are whitish, the rows also are not all the same distance apart. The prothoracic granules on abrasion are seen to be each supplied with a distinct puncture (for the reception of a seta), and with other very small ones (for the scales). In the male the elytral punctures are of about equal width with the interstices, but in the female they are smaller; the granules are often confined to the suture and third interstice, but they are occasionally also present on the second. The claws are closer together than usual.

Readily distinguished from the preceding species by the curved apex of the basal segment of abdomen. The two species, however, are not much alike. I sent specimens of this species to the Rev. T. Blackburn, and of them he wrote:—"They are quite distinct from all my species and from Erichson's. The narrower and more brightly coloured specimens (male, I suppose) bear a certain resemblance to *sterilis*, Er., but that species has alternate interstices carinate, suture quite strongly carinate behind, rostral carina much feebler and shorter, no carina on ventral segments (unless I am mistaken in considering it a male)," etc., etc.

MANDALOTUS LITORALIS, n. sp.

Male. Black; antennæ and legs (wholly or in part) reddish. Densely clothed with brown, mottled with sooty scales.

With moderately dense, suberect setæ, usually dark, but whitish in places.

Rostrum, scape, and *prothorax* much as in the preceding species. *Elytra* regularly arcuate at base; with series of large round punctures, as wide as interstices or wider, but appearing much smaller through clothing; interstices regular. *Abdomen* with small more or less concealed granules, all the sutures straight; basal segment at apex with a depressed shining almost straight carina, extending across less than one-third of apex. *Legs* stout; front coxæ feebly separated; tibiæ rather feebly curved and all more or less feebly denticulate below. Length, $3\frac{1}{4}$-$3\frac{3}{4}$ mm.

Female. Differs in having narrower prothorax and wider elytra, simple abdomen and straighter tibiæ.

Hab.—Tasmania: Hobart (on sea-beach. A. M. Lea).

On the elytra the bulk of the scales are of a rather pale brown, with the sooty scales in irregular blotches; on the prothorax the sooty scales cover a larger area than the paler ones. In one of the two males before me both hind tibiæ have a minute inner tooth about one-third from apex. The claws are as close together as in the preceding species, from which it is readily distinguished by the straight abdominal suture, in consequence of which the basal segment is fully twice the length of the second along the middle, instead of about once and a half as in that species. From *bryophagus* it is distinguished by the slightly separated front coxæ and regularly arcuate base of elytra, etc.

Mandalotus arciferus, n. sp.

Male. Black; antennæ, tibiæ, and tarsi reddish. Densely clothed with muddy-brown scales; with rather long suberect setæ. Tibiæ with a rather thin fringe of long cilia.

Rostrum with carina rather feebly traceable through clothing. Antennæ thin; scape rather suddenly thickened at apex; first joint of funicle fully once and one-half the length of second. *Prothorax* feebly transverse, sides strongly but not uniformly rounded; median line narrow and usually concealed; closely covered with large, flattened, and more or less rounded granules, not very distinctly traceable through clothing. *Elytra* trisinuate at base, base not quite as wide as near apex of prothorax; with subtubercular elevations in places; with series of large, round, more or less irregular, and usually concealed punctures. *Abdomen* with a semi-circular, flat, shining basal space on basal segment, marked outwardly by a distinct carina, apex strongly incurved to middle. *Legs* stout; front coxæ widely, the middle still more widely separated; tibiæ rather thin, the front pair strongly bisinuate below, the others rather feebly bisinuate. Length, $4\frac{1}{2}$-$5\frac{1}{2}$ mm.

Female. Differs in having the prothorax narrower and elytra wider, abdomen simple, appendages shorter, tibiæ stouter, the front pair much less strongly bisinuate and the others almost straight.

Hab.—Tasmania (Macleay Museum): King Island (Jas. A. Kershaw and A. M. Lea); Victoria: Mordialloc (National Museum).

The scales on most of the specimens before me (except for feeble rings on the legs) are quite uniformly coloured, but on some there are very feeble traces of pale spots. The setæ are rather denser and longer than usual, although not so dense or thin as in *variabilis;* they are mostly dark-brown in colour, but many are straw-coloured; on the lower surface they are thinner than on the upper. The prothoracic granules are rather large and less uniform than in the two preceding species, but are much less distinct through the clothing. Many of the elytral punctures are also scarcely traceable, but on abrasion they are seen to be much wider than the interstices, and not in quite regular rows; the interstices themselves are decidedly irregular, and on abrasion are seen to be highly polished and without punctures. The subtubercular elevations vary on different specimens.

The male has an abdominal plate somewhat as in *ventralis;* but the flattened space is transverse and does not infringe on the second segment; in *ventralis* the first segment along its middle is about thrice the length of the second; but in the present species the first is but slightly longer than the second. The carina also appears almost to connect the hind coxæ together; at its apex it does not touch the apex of the segment; and the tibiæ are very different.

Mandalotus longicollis, n. sp.

Male. Black; antennæ, tibiæ (partly or entirely), and tarsi reddish. Densely clothed with dark muddy-brown scales, with rather stout, semi-decumbent setæ. Tibiæ fringed with long cilia.

Rostrum with a narrow carina, more or less concealed, except towards apex. Antennæ rather thin. *Prothorax* (by measurement) slightly longer than wide, sides regularly rounded; median line narrow and partly concealed; with numerous fairly large, rounded (scarcely flattened) granules, not very distinct before abrasion. *Elytra* strongly trisinuate at base, interstices subtuberculate in places, with rows of large more or less concealed punctures. *Abdomen* with a flattened space curved towards and extending almost to apex, and bounded behind by a feeble carina, apex feebly incurved to middle. *Legs* stout; front coxæ very widely separated; front tibiæ strongly bisinuate, hind pair strongly incurved at apex. Length, 6½ mm.

Hab.—New South Wales: Jindabyne (H. J. Carter).

On the sides and shoulders of prothorax the scales are rather paler than elsewhere, but in the only specimen before me they are nowhere distinctly variegated. On the elytra the setæ are rather sparsely and irregularly distributed, elsewhere they are fairly dense. The prothoracic granules are not clearly defined through the clothing. The third interstice at its base is thickened to a much greater extent than usual, is thickened again at its middle, and then depressed below the others; the punctures are somewhat irregular and are usually wider than the interstices; although before abrasion apparently much smaller or quite absent. The interstices on abrasion are seen to be shining, almost or quite impunctate and with minute scattered granules (these quite invisible normally). The middle of the prosternum is slightly concave in front of and slightly concave behind the median sulcus, and is marked with large punctures, and which are not at all concealed by scales. The apex of the abdominal plate is terminated by a feeble, almost double carina (this appearance being due to an impression along its middle), at its middle it quite touches the apex.

In general appearance rather close to the preceding species, but the prothorax longer than wide, with larger and less flattened granules, elytra more decidedly trisinuate at base, and abdominal carina different. The antennæ are much the same, but are not quite so long, the scape is not so suddenly thickened at apex, and the basal joint of funicle is shorter. The hind tibiæ have the same remarkable apex as in the male of *ventralis*, but are longer and thinner and are without granules; the basal segment of abdomen is also incurved instead of outcurved at the middle of its apex.

Mandalotus granulatus, n. sp.

Black; antennæ and appendages (these in parts stained with black) reddish. Densely clothed with muddy-brown feebly-variegated scales; legs feebly ringed. With rather numerous straw-coloured setæ. Tibiæ with thin setæ, but not fringed with long cilia.

Rostrum with a narrow carina, concealed on basal half. Antennæ rather stouter than in the preceding species, with the scape more sinuous. *Prothorax* (by measurement) just perceptibly longer than wide, with a feeble concealed median line, granules much as in preceding species. *Elytra* trisinuate at base; alternate interstices slightly raised, first and third with numerous (the others with few or none) small shining setose granules; punctures not very distinct through clothing, and on abrasion narrower than interstices. *Under-surface* with small shining granules, more numerous and rather larger on abdomen than elsewhere. Basal segment of *abdomen* feebly incurved at apex, with a strong carina extending about half way across near (its middle on) the apex, moderately curved at sides, its middle very feebly incurved. *Legs* moderately stout; front coxæ widely separated; femora with a few minute granules; tibiæ granulate below, front pair strongly curved, the others almost straight. Length, 7 mm.

Hab.—Tasmania: Mount Wellington (A. M. Lea).

Each granule of both upper and lower surfaces bears a seta, although all the setæ do not rise from granules.

In general appearance close to the preceding species, but the prothorax slightly shorter; the elytra with granules larger, more numerous, and quite distinct before abrasion, not so strongly trisinuate at base, the shoulders more advanced, subtuberculate only at base, the punctures smaller, the hind tibiæ and the abdominal granules and carina different.

Two females, from Hobart and Launceston, probably belong to this species; they differ from the male in having the prothorax feebly transverse, the elytra with numerous pallid spots, the abdomen more convex and non-carinate, the tibiæ straighter, and the granules on the legs not quite so conspicuous.

Mandalotus carinativentris, n. sp.

Male. Black; antennæ and legs dull red. Densely clothed with muddy-brown, mottled with paler and darker, scales; legs feebly ringed; with rather long and stout setæ, less numerous and regular but more conspicuous on elytra than on prothorax.

Rostrum with carina concealed by clothing, but distinctly traceable throughout. *Prothorax* apparently as long as wide, sides strongly and evenly rounded; median line partially concealed; with dense, round, flat, fairly large granules, distinctly traceable through clothing. *Elytra* with basal arcuation feebly sinuous; with regular rows of large, partially-concealed punctures; interstices very feebly alternately raised, the first to third with minute shining granules. *Abdomen* with numerous small granules on first and fifth segments, and a few very indistinct ones on second; first feebly incurved at apex, with a strong, shining, feebly-curved carina, the middle of its apex on apex of segment. *Legs* strong; front coxæ widely separated; tibiæ granulate below, the front pair strongly curved towards apex, apex itself (as also that of the second pair) acutely produced; claws very feebly separated. Length, 6 mm.

Female. Differs in being more robust, abdomen more convex and without carina, tibiæ straighter, etc.

Hab.—Tasmania: Frankford (in moss), Swansea (A. M. Lea).

The scape is darker than the funicle, and the legs are not of uniform colour. On one specimen the apical scales of the femora are almost golden, on several some of the scales on head and apex of rostrum have a distinct bluish gloss; there is usually a small patch of pale scales on each side near the scutellum. The minute elytral granules are quite distinct in both sexes before abrasion, the interstices from above seem perfectly uniform, but from behind feebly alternately raised; they appear to be much wider than the punctures, but on abrasion are seen to be only about the same width.

Shorter and more robust than the preceding species, granules less conspicuous, and on the third and fourth abdominal segments quite absent; the front tibiæ are also acutely produced at the apex, whilst in the preceding species the produced part (although appearing pointed from some directions) is really in the form of a flange, slightly incurved at its apex. The abdominal carina is almost as in *Blackburni*, but the front coxæ are rather widely separated instead of almost touching as in that species.

Mandalotus imitator, n. sp.

Densely covered with muddy-brown scales, feebly variegated on prothorax and base of elytra; with moderately long subdecumbent setæ.

Rostrum rather stouter than usual, carina traceable throughout, but uncovered only on apical third. Antennæ rather short, but not very stout. *Prothorax* feebly transverse, sides strongly and evenly rounded; granules much as in preceding species; without median line. *Elytra* conjointly arcuate at base; with large, partially-concealed punctures; interstices quite regular. *Abdomen* as in the preceding species, except that the carina does not quite touch the middle of apex. *Legs* stout; front coxæ widely separated; tibiæ dentate below, front pair strongly curved towards and swollen at apex, then somewhat acutely produced. Length, 6½ mm.

Hab.—Tasmania: Swansea (A. M. Lea).

The type and only specimen I have seen is entirely of a dull or livid red (except as to its clothing), but this may be due to immaturity. Probably its colours are like those of most species, *i.e.*, black, with more or less red appendages. On the elytra the setæ are rather long and of two colours—

dark-brown and whitish; on the prothorax they are shorter and almost black. Before abrasion the interstices seem much wider than the punctures; but after, they are seen to be of equal width.

In appearance very close to the preceding species; but the elytra entirely without granules; the apex of the front tibiæ is intermediate in character between that species and *granulatus*, in having only one side of the flange produced.

MANDALOTUS CARTERI, n. sp.

Male. Colour and clothing much as in *longicollis*.

Rostrum with carina concealed. Antennæ thin. *Prothorax* moderately transverse, sides strongly rounded; median line feeble, with very feeble tubercles, scarcely traceable before abrasion. *Elytra* scarcely trisinuate at base; interstices elevated, with rows of large, partially-concealed punctures. *Abdomen* much as in *arciferus*, but the middle of the carina distant fully one-third from the apex of basal segment. *Legs* stout; front coxæ widely separated; front tibiæ strongly bisinuate below, middle pair swollen on basal half, and strongly curved on apical half, hind pair feebly curved, not strongly incurved at apex. Length, 6 mm.

Hab.—New South Wales: Jindabyne (H. J. Carter), Mount Kosciusko (R. Helms).

The clothing of the under surface is rather sparse, and consists mostly of fine setæ, but that of the upper surface and of the legs is almost exactly as in *longicollis;* but the abdominal carina and hind tibiæ are very different to those of that species. In *arciferus*, which at a glance it strongly resembles, the carina is much nearer the apex, and the prothoracic and elytral sculpture are seen to be very different on abrasion.

MANDALOTUS SABULOSUS, n. sp.

Male. Dark reddish-brown, appendages paler. Densely covered with slaty-grey scales, sometimes more or less mottled; with moderately long and thin semi-erect setæ. Tibiæ with a rather thin fringe of cilia.

Eyes smaller and more convex than usual. *Rostrum* with carina uncovered throughout. Antennæ thin, first joint of funicle fully once and one-half the length of second. *Prothorax* moderately transverse, sides strongly and almost uniformly rounded; median line usually distinct; with dense, round, flattened granules, only partially concealed. *Scutellum* small but distinct, and shining. *Elytra* almost truncate at base, elongate subcordate; with rows of comparatively small, partially-concealed punctures; interstices gently and regularly convex. *Abdomen* densely punctured, the two basal segments wrinkled as well; basal with a narrow curved apical carina. *Legs* strong; front coxæ rather widely separated; tibiæ granulate below, rather strongly inflated at apex, the front pair more noticeably curved than the others. Length, 5¼-6 mm.

Female. Differs in being rather more robust, abdomen more convex, less wrinkled, and non-carinate, and the tibiæ straighter.

Hab.—Tasmania: Ulverstone, Swansea (A. M. Lea).

A narrow species readily distinguished from most others by the scarcely emarginate base of elytra and shining scutellum, the latter being distinct in all the numerous specimens before me. The scales on the upper surface are sometimes quite uniform in colour, but they are often variegated with spots of paler scales; towards the apex of the elytra there are often patches of pale and dark scales, quite strongly contrasted. The setæ of the legs are unusually long. The scales of the prothorax are very readily abraded, so that its disc often appears to be almost glabrous. The rostral carina is distinctly traceable throughout; behind it, on the head, there is a distinctly impressed line. The abdominal carina at its middle touches the apex of the segment, but it is not very conspicuous, owing to the way that segment is wrinkled, and it does not extend across one-third of the width. The species is abundant at the roots of beach-growing plants.

Mandalotus Sydneyensis, n. sp.

Male. Dark, reddish-brown; coxæ and apex of abdomen paler, antennæ, tibiæ, and tarsi still paler. Densely clothed with slaty-grey scales, mottled with small spots of brown. Clothed with long, thin, pale, semi-erect setæ. Tibiæ ciliated.

Rostrum with moderately distinct carina. Antennæ thin, first joint of funicle not much longer than second. *Prothorax* much as in the preceding species, except that the granules are not so distinct; *elytra* shorter, but otherwise much the same. *Scutellum* absent, or at least not visible. *Abdomen* as in the preceding species, except that the punctures are stronger, the wrinkles less conspicuous and the carina more so. *Legs* much the same. Length, 5 mm.

Hab.—New South Wales: Sydney (H. W. Cox).

In appearance close to the preceding species, with which it agrees in the subtruncate base of elytra and in the sexual differences, but it is shorter and with the setæ (especially on the elytra) distinctly longer: the scutellum also appears to be quite absent. The rostral carina, although not covered with scales, is partly obscured by setæ.

Mandalotus mirabilis, n. sp.

Male. Black; antennæ and tarsi reddish. Densely clothed with muddy-brown scales. With moderately dense but rather short setæ, which on the elytra are irregularly distributed. Under surface, except on sides, with long, thin straw-coloured hair. Front tibiæ with dense and long cilia.

Rostrum stout, carina distinct throughout. Antennæ rather thin. *Prothorax* decidedly transverse, sides very strongly rounded, apex subtubular; with numerous oblong or elliptic granules, more or less transversely or obliquely arranged. *Elytra* somewhat sinuous at base, with a rather large tubercular swelling just behind each shoulder on the side, elsewhere (especially about and on posterior declivity) with subtubercular elevations. *Abdomen* concave along middle. *Legs* strong; front coxæ widely separated; tibiæ wider than usual, all more or less strongly curved, the hind pair distorted at apex. Length, 9½ mm.

Hab.—New South Wales: Illawarra (Australian or Macleay Museum).

Larger and probably more distinct than any other known species. From the description of *valgus*, and all other species, the long clothing of the under surface will readily distinguish it; this clothing appears to be of three kinds—long thin hair clothing most of the under surface, towards the sides interspersed with stout setæ, and at the sides scales. The front tibiæ have denser and perhaps longer ciliæ than any other species here noted; the hind tibiæ are rather sparsely and the middle tibiæ scarcely ciliated. The clothing is so dense as almost to prevent the sculpture being traced through it; on abrasion the prothorax is seen to have a distinct median line, and to be covered with numerous granules appearing like interrupted carinæ. The scutellum appears to be of comparatively large size, although normally quite concealed. The elytral punctures are often quite hidden, but are large, round, and wider (except at the thickened parts) than the interstices. Each of the middle coxæ appears to be concave internally, or to be supplied with an arcuate carina, the convex side of which is towards the side. The hind tibiæ are very strongly and suddenly inflated and curved at the apex (in addition to the ordinary curvature), this portion being highly polished internally: at its inner apex it is terminated by three small spines or teeth; the tarsi are set on the inflated portion. The front tibiæ appear to be slightly twisted, with a carina or ridge marking the upper side of each.

Mandalotus niger, n. sp.

Black; funicle, club, and tarsi reddish. Very densely clothed with black scales, becoming greyish on parts of the legs and under surface; with short, stout, more or less decumbent setæ.

Rostrum stout; carina covered with scales, but feebly traceable throughout. Antennæ moderately stout. *Prothorax* moderately transverse, sides strongly rounded; median line partly concealed; with numerous large, rounded granules or small tubercles, not very clearly traceable through clothing. *Elytra* conjointly but not quite regularly arcuate at base, subtuberculate in places, and especially about posterior declivity; with large, round, almost concealed punctures. *Abdomen* feebly convex. *Legs* stout; front coxæ widely separated; tibiæ feebly curved, the posterior almost straight. Length, 6-7 mm.

Hab.—New South Wales: Blue Mountains (E. W. Ferguson).

On the prothorax the setæ vary from straw-coloured to black, on the elytra they are nearly all deep black, and are short, stout, and very irregularly distributed. The elytral punctures are as wide as the interstices, but the clothing is so dense that they appear much smaller, and many are quite concealed.

Two specimens are before me, both apparently of one sex, and probably females. I have described them, however, as even as females they represent a very distinct species. In build they have a certain resemblance to *amplicollis*, but apart from the clothing, the emargination of apex of prosternum is much less sudden and deep.

Mandalotus Coatesi, n. sp.

Male. Black; antennæ, legs, and apical half of abdomen reddish. Densely clothed with uniformly pale muddy-brown scales. With stout and rather pale setæ, sparser, and more irregularly distributed on elytra than elsewhere; under surface with thin setæ. Front tibiæ densely ciliated.

Rostrum stout, antennæ rather thin. *Prothorax* feebly transverse, sides regularly rounded; median line partly concealed; with numerous, large, round, flattened granules, readily traceable through clothing. *Elytra* trisinuate at base; subtuberculate in places; with large, round punctures, much wider than interstices, but appearing much narrower through clothing. *Abdomen* granulate, two basal segments feebly concave. *Legs* stout; front coxæ widely separated; tibiæ granulate below, front pair strongly curved at apex, hind pair dilated to middle, then suddenly narrowed towards (but not at) apex. Length, $4\frac{1}{2}$ mm.

Female. Differs in being more robust, elytral punctures smaller, abdomen gently convex, tibiæ straighter, the hind pair longer and not so suddenly narrowed beyond the middle.

Hab.—New South Wales: Richmond River (A. J. Coates).

Of the two specimens before me, the female has the rostral carina uncovered throughout, in the male it is uncovered only on the apical half. The hind tibiæ of the male appear to be obtusely dentate at about their middle.

MANDALOTUS ARCUATUS, n. sp.

Male. Blackish; appendages reddish. Densely clothed on both surfaces with pale, muddy-grey scales; with short, stout setæ, longer, sparser, and less depressed on elytra than on prothorax. Front tibiæ with long but sparse cilia.

Rostrum with carina more or less concealed by clothing. Antennæ rather thin. *Prothorax* flattened, moderately transverse, sides strongly and regularly rounded; median line absent; with transverse granules or interrupted carinæ, more or less concealed by clothing. *Elytra* conjointly arcuate at base; with large, round punctures the width of interstices, but appearing much smaller through clothing, interstices regular. *Abdomen* with two basal segments very feebly concave in middle. *Legs* stout, especially front femora; coxæ widely separated, front tibiæ strongly curved at apex. Length, $2\frac{1}{2}$ mm.

Female. Differs in having the prothorax narrower and elytra wider, abdomen gently convex and front tibiæ straighter.

Hab.—New South Wales: Rooty Hill (E. W. Ferguson).

In appearance like a small *Polyphrades*, and the sexes differ in much the same way, but the claws are separated at an angle of about 45 degrees.

MANDALOTUS TRISINUATUS, n. sp.

Male. Reddish-brown, appendages paler.

Rostrum with carina very feebly or not at all traceable through clothing. Antennæ rather thin. *Prothorax* moderately convex and transverse; sides strongly rounded; median line absent; with large transverse granules or interrupted carinæ. *Elytra* trisinuate at base; with large round punctures, the width of, or wider than, interstices, but more or less concealed; alternate interstices raised. *Abdomen* with two basal segments gently concave. *Legs* stout; front coxæ rather widely separated, middle coxæ not quite so widely separated; front tibiæ rather strongly curved at apex, hind pair inflated and distorted at apex, and subdentate at basal third internally. Length 3 mm.

Hab.—Victoria: Bright (C. French).

In general appearance and with clothing as in the preceding species, but readily distinguished therefrom by the trisinuate base of elytra, which also has the alternate interstices raised; the prothorax is more convex and its granules or carinæ are also decidedly wider and less numerous: the hind tibiæ are also very different.

MANDALOTUS SETOSUS, n. sp.

Male. Densely clothed with muddy-brown, very feebly variegated scales. Prothorax with semi-erect, rather short brown setæ, directed towards the middle from each side; elytra with pale and dark setæ, dense on suture, third, fifth, and seventh interstices, very sparse between these, and absent on sides, except at base and apex. Front tibiæ with comparatively short and sparse cilia.

Rostrum with carina uncovered only on apical third. Antennæ thin, but scape rather suddenly thickened at apex. *Prothorax* feebly transverse, sides strongly and regularly rounded; with numerous slightly-interrupted transverse carinæ, quite distinct through clothing; median line very feebly marked. *Elytra* subtrisinuate at base, sides rather suddenly narrowed at shoulders; with rows of large, round punctures, usually wider than interstices, but appearing very small through clothing; alternate interstices feebly raised. Basal segment of *abdomen* moderately concave in middle, the second flattened there. *Legs* stout; front coxæ rather widely separated. Front tibiæ strongly curved at apex. Length, $6\frac{1}{2}$ mm.

Female. Differs in having prothorax narrower and elytra wider, abdomen convex, and tibiæ straighter.

Hab.—New South Wales: Windsor (A. M. Lea).

In general appearance very close to *piliventris*, but readily distinguished by the transverse sculpture of prothorax; from *Crawfordi* it differs in being larger, alternate interstices elevated, and abdomen densely clothed, with basal segment concave. All the tibiæ are also different.

MANDALOTUS NODICOLLIS, n. sp.

Blackish-brown, parts of antennæ and tarsi paler.

Rostrum very stout, carina quite concealed. Antennæ stout, especially the scape. *Prothorax* strongly transverse, base and apex truncate, sides rather feebly rounded: with large, round, isolated, and not very numerous granules of varying sizes. *Elytra* truncate at base; with large rounded or transversely suboblong punctures, usually wider than interstices; these rather feebly alternately raised. *Abdomen* with basal segment concave along middle and middle of apex.

Legs short and stout; front coxæ feebly separated; tibiæ (comparatively) feebly curved at apex. Length, 3-4½ mm.

Hab.—Queensland: Mackay, Darling Downs (C. French), Gayndah (G. Masters), Brisbane (A. Jefferis Turner), Townsville (H. H. D. Griffith).

Although there are twelve specimens before me, the scales of the upper surface are so uniformly covered with mud (3) that it is only in small spots that they can be seen; judging by these the clothing is very dense, and more or less greyish-white; but above the mud, stout, brown, almost perfectly erect setæ arise to a considerable height, both on prothorax and elytra. The under surface and legs are very densely covered with muddy-grey scales interspersed with numerous and rather thin whitish setæ. If the sexes are before me I am unable to distinguish them. The front coxæ are almost touching (with the clothing in position they appear to be in actual contact), the middle tibiæ are separated by a quite round tubercular elevation, but this is usually obscured by scales and mud. The granules of the prothorax, which are very distinctive of this species, and elytral punctures are entirely concealed before abrasion. With the exception of the following species, the scape is stouter than in any other known to me.

Mandalotus crassicornis, n. sp.

Black or dark reddish-brown, appendages paler. Densely clothed with light-brown scales, mottled in places. With fairly stout, rather sparse setæ, sparser on alternate interstices of elytra than elsewhere; under-surface with fine setæ. Tibiæ finely ciliated in male, but not in female.

Rostrum stout, carina covered with scales, but distinctly traceable throughout. Antennæ stout, scape very stout. *Prothorax* moderately transverse, sides strongly and regularly rounded; median line distinct: with numerous flattened, rounded, or irregular granules, clearly traceable through clothing. *Elytra* elongate-cordate, conjointly rather feebly arcuate at base; with rows of round punctures, distinctly narrower than interstices, and appearing very much narrower through clothing; alternate interstices feebly raised. *Abdomen* with basal segment gently concave in male, feebly convex in female. *Legs* stout; front coxæ feebly separated; front tibiæ feebly curved at apex. Length, 4½-4¾ mm.

Hab.—New South Wales: Sydney (on sea-beaches, Taylor Bros.); Queensland: Brisbane (A. Jefferis Turner).

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(3) I was not able to remove this without at the same time removing the clothing, even on soaking for several hours in water.

The intensity of colour, especially of the legs, varies, and one specimen is almost entirely red. The mottling of the scales consists of feeble dark spots on the elytra, and feeble, short, lateral stripes on the prothorax, but in only two out of five specimens are the markings at all distinct, whilst in one they are entirely absent. The scape is remarkably stout, at its widest being fully as wide as the space between the scrobes at the apex of rostrum, and much wider than the club; the femora are also much stouter than usual. The sexual differences are but slight.

MANDALOTUS FERGUSONI, n. sp.

Male. Black; appendages somewhat paler, tarsi distinctly paler. Densely covered with muddy-brown scales, variegated with small sooty spots. With short, stout, semi-erect setæ; under-surface with fine setæ in addition to scales. Front and hind tibiæ finely ciliated.

Rostrum with carina quite concealed. Antennæ moderately stout. *Prothorax* moderately transverse, sides strongly rounded; median line deeply impressed; with minute scattered granules entirely concealed by clothing. *Elytra* subtrisinuate at base; with large round punctures, much wider than interstices, but appearing much narrower through clothing; alternate interstices feebly raised. Basal segment of *abdomen* feebly concave in middle. *Legs* stout; front coxæ moderately separated; four front tibiæ rather strongly bisinuate, the hind pair strongly but obtusely bidentate internally. Length, 5 mm.

Hab.—New South Wales: Muswellbrook (E. W. Ferguson).

The posterior tooth of the hind tibiæ is just beyond the middle, is more obtuse than the other, and has a peculiarly-granulated appearance. Mr. Ferguson has sent three specimens as belonging to this species, the male described above and two females: the male is perhaps partially abraded of setæ, as on the females they are much more numerous, and being frequently white, both on the prothorax and elytra, they give the upper surface a peculiarly-speckled appearance. On the under surface of the females also the scales are denser and paler, and the setæ sparser and stouter, these, however, being common sexual variations. The females (which measure but 4 mm.) also have the basal segment of abdomen flat, the hind tibiæ edentate, and are more robust.

MANDALOTUS SETICOLLIS, n. sp.

Male. Blackish; appendages dull-red. Upper surface (except pronotum) densely covered with sooty-brown scales, variegated with numerous spots of slaty-grey scales. Densely clothed with long, thin, semidecumbent setæ; shorter, thinner, and denser on under than on upper surface. Tibiæ very feebly ciliated.

Rostrum with carina uncovered throughout. Antennæ thin; first joint of scape more than once and one-half the length of second. *Prothorax* somewhat flattened, sides strongly rounded in front, rather feebly behind; with dense, more or less rounded and flattened, shining granules, not at all concealed. *Elytra* conjointly feebly arcuate at base; with punctures much narrower than interstices, and their size not much altered in appearance by clothing; interstices regular, with minute, scattered, depressed granules, and which are quite invisible before abrasion. *Abdomen* densely granulate; two basal segments largely and conjointly concave, apical strongly convex. *Legs* stout, with feeble granules; front coxæ rather widely separated; tibiæ feebly curved, but strongly inflated at apex. Length, $5\frac{1}{2}$-6 mm.

Female. Differs in being more robust, basal segments of abdomen rather strongly convex, and the apical less so, and the tibiæ straighter.

Hab.—Tasmania: Ulverstone (on sea-beach. A. M. Lea).

Of the two males before me, one has the head, rostrum, and apex of prothorax diluted with red, in the other these parts are as dark as elsewhere; in the only female no part of the derm is quite black. The pale spots of scales on the elytra are very numerous, and from certain directions appear to form feeble, much-interrupted, transverse lines. On abrasion the head is seen to have small scattered granules. The median prothoracic line is present on the female, but absent from the males.

Readily distinguished from most species by the entire absence of scales from the pronotum, although the setæ there are as dense as elsewhere. In the table it is placed near *reticulatus*, but the two species have little in common.

Mandalotus similis, n. sp.

Male. Black; antennæ and tarsi dull-red, other parts of the legs very obscurely diluted with red. Densely covered with muddy-brown scales. With subdecumbent setæ, mostly brown, but in places straw-coloured. Front tibiæ with long and moderately dense ciliation, the others very feebly ciliated, all the femora with long pale hair.

Rostrum stout; carina rather feeble, but distinct throughout. Antennæ rather thin. *Prothorax* about as long as wide; median line very narrow; with minute scattered granules, quite concealed normally. *Scutellum* small but distinct.

Elytra rather feebly arcuate at base, rather strongly diminishing in width from basal fourth; with large round punctures, distinctly wider than interstices, but appearing much smaller through clothing; interstices regular. Basal segment of *abdomen* feebly concave. *Legs* stout; front coxæ rather widely separated; front tibiæ rather strongly curved at apex. Length, 4½ mm.

Female. Differs in being wider, punctures smaller, basal segment of abdomen rather strongly convex and tibiæ straighter.

Hab.—New South Wales: Forest Reefs (A. M. Lea).

In the only male before me the scales are quite uniform in colour, but in the female they are somewhat mottled, and the legs have feeble pale rings. The prothoracic sculpture is much as in *Fergusoni*, but the edentate hind tibiæ should prevent the two species from being confused together. In general appearance both sexes are much like those of *piliventris*, but the prothoracic granules are very different.

MANDALOTUS HUMERALIS, n. sp.

Male. Reddish-brown, appendages paler. Densely clothed with muddy-brown scales, and with rather sparse setæ. Front tibiæ very sparsely ciliated.

Antennæ rather stout. *Prothorax* moderately transverse, rather flat, sides strongly rounded; median line narrow; with numerous fairly large and rounded, but subobsolete, granules, not readily traceable through clothing. *Elytra* trisinuate at base, rather suddenly inflated behind shoulders, and thence rather strongly descreasing in width to near apex; with rows of large punctures, usually twice the width of interstices, or even more, but often almost or quite concealed; interstices feebly thickened in places. Basal segment of *abdomen* gently concave. *Legs* stout; front coxæ rather widely separated; front tibiæ rather strongly curved at apex. Length, 3¼ mm.

Female. Differs in being larger and wider, less angular in appearance, abdomen gently convex throughout, and tibiæ straighter.

Hab.—New South Wales: National Park (in rotting leaves. A. M. Lea).

In both specimens before me the scales are without variation, but in places are obscured by dirt, as is so frequently the case with species living in decaying leaves. The setæ of the upper surface are rather sparse and irregularly distributed, and vary in colour from whitish to dark-brown. One specimen has the rostral carina entirely concealed, but in the other it is distinct (almost certainly through abrasion) in the middle.

Although placed in the table with the species having the elytra non-tuberculate, these organs certainly appear slightly swollen in places on the disc. The male is a peculiarly-rough, angular insect, but the female is quite normal-looking, and rather strongly resembles the female of *hoplostethus*.

MANDALOTUS AVENACEUS, n. sp.

Male. Densely covered with muddy-brown, feebly-mottled scales. With subdecumbent brownish setæ. Front tibiæ rather sparsely ciliated.

Rostrum with carina distinct throughout. Antennæ rather thin. *Prothorax* feebly transverse, sides strongly and regularly rounded; median line distinct; with minute scattered granules, almost or quite invisible before abrasion. *Elytra* rather feebly trisinuate at base; subcordate; with rows of large rounded punctures, much wider than interstices, but appearing much smaller through clothing; interstices feebly alternately raised. *Abdomen* with basal segment gently concave. *Legs* stout; front coxæ rather widely separated; front tibiæ with a strong median ridge, ending posteriorly in a strong obtuse tooth. Length 3 mm.

Hab.—Victoria: Daylesford ("destroying oats." National Museum).

There are five specimens before me, but all are males; in most of them the elytra appear to be black, with the prothorax, antennæ, and tarsi reddish, and the other parts reddish-brown. The setæ, although fairly numerous, are very indistinct, except from the sides. The mottling on the prothorax appears to form very feeble stripes. In general appearance close to *arcuatus* and *trisinuatus*, but readily distinguished therefrom by the granules of prothorax, and the dentate front tibiæ.

MANDALOTUS ALBONOTATUS, n. sp.

Male. Black; under surface and appendages more or less red. Densely covered with muddy-brown scales, variegated in places with sooty and white or whitish scales. With stout semi-erect setæ, mostly dark-brown, but in places white or straw-coloured. Front tibiæ with rather short ciliation.

Rostrum with carina quite concealed, except at its tip. Antennæ thin. *Prothorax* rather feebly transverse, sides strongly rounded; median line distinct; with dense and fairly large but almost obsolete granules. *Scutellum* distinct. *Elytra* conjointly arcuate at base; with series of large, rounded punctures, the width of or wider than interstices, but apparently much narrower; alternate interstices feebly raised, the suture on its apical half more noticeably raised. *Abdo-*

men with numerous small granules, the basal segment somewhat concave. *Legs* stout; front coxæ widely separated; front tibiæ rather feebly bisinuate. Length, $4\frac{1}{3}$-5 mm.

Hab.—Victoria: Apollo Bay (C. French).

The clothing of the under-surface (except at sides of sterna) consists entirely of rather fine setæ. On the five specimens before me there is always a distinct spot (or short stripe) of white scales on the third interstices at the base, and these are sometimes connected across the extreme base; the sides of the prothorax are usually marked with broken and irregular whitish stripes; there is also a distinct white spot at the side of each eye. The legs have more or less distinct whitish rings, usually two on each of the femora and tibiæ. The sooty scales may cover but a small portion of the derm or more than half. The prothoracic granules are scarcely traceable through the clothing, and when this has been removed are seen to be but very feebly elevated, and in fact the slight swellings should perhaps not be regarded as granules at all. The hind tibiæ at the lower inner edge are feebly ridged, and the ridge terminates rather suddenly at about one-third from the apex; but it is not distinct, and is quite invisible from most directions.

The two spots at the base of the elytra cause it to resemble several species, especially *simulator*, *carinativentris*, and *Blackmorei*, from all of which it may be distinguished by characters given in the table; *sterilis* (4) is apparently a narrower species, with the alternate interstices more strongly raised, and the abdomen and hind tibiæ different.

MANDALOTUS OCHREONOTATUS, n. sp.

Male. Of a dingy-brown; funicle, club, and parts of legs paler. Densely covered with sooty-brown scales, variegated in places. With stout, regularly-distributed, subdecumbent setæ, mostly dark-brown, but varying to white. Front tibiæ with rather short ciliation.

Rostrum much as in the preceding species. Antennæ somewhat stouter. *Prothorax* rather feebly transverse, sides very strongly rounded; median line very narrow, and usually concealed; with minute, scattered, and normally-concealed granules. *Elytra* conjointly arcuate at base; with series of large, rounded punctures, usually distinctly wider than interstices, but appearing much smaller through clothing; interstices regular. *Abdomen* with basal segment flat, or very slightly concave in middle. *Legs* strong; front coxæ moderately separated; front tibiæ moderately trisinuate. Length, $4\frac{1}{2}$ (female, 5) mm.

(4) According to Mr. Blackburn's notes on the type in these "Transactions" for 1901, p. 27.

Female. Differs in being larger and wider, elytra more rounded, abdomen more convex, and tibiæ straighter.

Hab.—New South Wales: Muswellbrook (E. W. Ferguson).

More or less ochreous scales cover the rostrum, parts of the head, sides of the prothorax (and usually a small discal spot), and the fourth interstices near the base; the legs are feebly ringed, the rings varying from whitish to ochreous. Towards the apex of the elytra the scales are mottled-grey and sooty, the mottling variable. The spot on the fourth interstice of each elytron appears sometimes as a stripe confined to that interstice, and extending from the base to about two-fifths from the base; sometimes it appears in a more rounded and isolated form, and extends to the third and fifth interstices; and it varies considerably in size, but on the five specimens before me it is always present and sufficiently conspicuous. The prothoracic granules are much as in *similis*, from which species, however, it is readily distinguished by the ciliation of the front tibiæ of the male. The colours, both of derm and scales, are also different.

MANDALOTUS MACULATUS, n. sp.

Male. Black, appendages and apex of abdomen red. Moderately clothed with greyish and darker scales; legs feebly ringed. Setæ subdecumbent, rather sparse, and varying from white to dark-brown. Front tibiæ scarcely ciliated.

Rostrum with carina uncovered at tip only, but traceable throughout. Antennæ thin; club comparatively large. *Prothorax* flattened; moderately transverse, sides rather suddenly lessened towards base and apex; median line feeble; densely and rather coarsely punctured. *Elytra* rather indistinctly trisinuate at base, considerably wider than prothorax, sides subparallel to apical third; with series of large rounded punctures, about the width of interstices, but appearing much smaller through clothing; interstices feebly alternately raised. *Abdomen* with basal segment almost flat in middle. *Legs* stout; front coxæ touching; front tibiæ rather feebly trisinuate. Length, $3\frac{1}{2}$ mm.

Female. Differs in being more robust, basal segment of abdomen quite distinctly convex, and tibiæ straighter.

Hab.—Tasmania: Hobart, Mount Wellington, Bruni Island, Huon River (A. M. Lea).

In some specimens the apex of the rostrum and of the prothorax and the whole of the abdomen are more or less reddish. The clothing is less dense than usual, and the pale scales on the elytra appear as feeble spots; both shape and markings are very suggestive of *Desiantha maculata*. The prothoracic punctures are greatly obscured before abrasion, and in places are replaced by rather feeble granules. The sutures of the third and fourth abdominal segments are deeper and wider than usual, but are the same as in the following species.

Mandalotus inusitatus, n. sp.

Male. Black; antennæ, tarsi, apex of tibiæ, base of femora, and the trochanters reddish. Moderately clothed with greyish and darker scales. With fairly numerous semi-erect, and mostly dark, setæ. Four front tibiæ rather feebly, the hind rather strongly, ciliated.

Rostrum with carina uncovered on apical half. Antennæ thin. *Prothorax* flattened in middle, moderately transverse, sides strongly rounded; median line absent; with numerous granules scattered about amongst punctures, both more or less concealed normally. *Elytra* conjointly arcuate at base; with series of punctures narrower than interstices on basal half, and much narrower posteriorly, and usually almost or quite concealed; interstices very feebly alternately raised, and with minute, scattered, concealed granules. *Abdomen* with basal segment gently concave. *Legs* stout, especially the front femora; front coxæ touching; front tibiæ rather strongly bisinuate below, and thinner than usual. Length 3 (female, $3\frac{3}{4}$) mm.

Female. Differs in being stouter, basal segment of abdomen gently convex, and the front tibiæ shorter and straighter.

Hab.—Tasmania: Hobart, Mount Wellington, Stonor, Huon River (under logs. A. M. Lea).

In general appearance close to the preceding species, but with the club darker, the elytral spots absent or less distinct, and the setæ more numerous and more erect. But it may be readily distinguished from that, and from all other species known to me, by the ciliation of the hind tibiæ being much stronger than that of the front pair, a character which is also not confined to the male (I can be certain of this, having taken a pair *in cop).* In two specimens there are feeble rings on the femora, but these are not traceable in nine others. Specimens are usually very muddy when obtained.

Mandalotus Blackmorei, n. sp.

Male. Reddish-brown or black; antennæ, tarsi, and other parts of legs paler than elsewhere. Densely covered with muddy- or sooty-brown scales, more or less variegated with whitish or blackish scales. With moderately dense, sub-decumbent setæ, frequently white, but varying to dark-brown.

Rostrum with carina uncovered throughout. Antennæ rather thin. *Prothorax* very feebly transverse, sides strongly rounded; median lines and granules very feeble. *Elytra* conjointly arcuate at base; with series of large round punctures, about the width of interstices, but appearing much smaller through clothing; interstices regular. *Abdomen* with basal segment gently concave. *Legs* stout, especially front femora; front coxæ moderately separated; front tibiæ moderately bisinuate beneath. Length, $4\frac{1}{4}$-$4\frac{3}{4}$ mm.

Female. Differs in being more robust, abdomen convex throughout, tibiæ straighter, etc.

Hab.—New South Wales: Forest Reefs (Albert Blackmore and A. M. Lea).

The derm of the elytra, the throat, and other parts of the under surface are sometimes quite black; but as a rule these parts are of a dark-brown, although usually darker than elsewhere; the prothorax is very rarely black. The scales are often rather strongly variegated, and there is usually a distinct white spot on the third interstice at base, and also at the side of each eye, somewhat as in *albonotatus*. On some specimens the scales are almost entirely dark, with more or less conspicuous whitish spots. The clothing of the abdomen consists of rather dense setæ, but with scales at the sides of the two basal segments. The front coxæ are very distinctly separated, but the distance between them is less than in most species, and is less in the male than in the female. It is, however, slightly more than in *pallidus* and *suturalis*, which species have been referred to another section in the table.

The prothoracic granules, although individually rather large, are quite invisible before abrasion, and are even more feeble than in *albonotatus*; in fact, from some directions the prothorax, even after abrasion, appears to be without them, but in certain lights very fine lines can be seen marking their edges; *albonotatus*, which it strongly resembles, has the prothorax larger, with a more distinct median line, the front coxæ more, and the middle coxæ much more, widely separated, the abdominal clothing sparser; and is altogether more robust. The mandibular appendages are present on one female before me, and are long, thin, and curved, much as in many species of *Leptops*.

SUB-FAMILY EURHYNCHIDES.

CTENAPHIDES GYMNOSTICTUS, n. sp.

Female. Dark reddish-brown. Densely covered with whitish setæ-like scales, almost uniform in distribution, except that the apical half of the rostrum is nude, and that there are nude spots forming rows on the alternate interstices of the elytra, the spots being more numerous on the sutural interstice than on the others.

Head with numerous and rather coarse, but partially-concealed, punctures; ocular fovea narrow and elongate. *Rostrum* rather thin, almost twice the length of head, feebly increasing in width to base and apex, rather coarsely punctured throughout, and with a very feeble median carina on the basal half. Antennæ inserted almost in exact middle of sides of rostrum, first-sixth joints subcylindrical, second slightly longer than third, and thinner, but not much shorter than first, seventh-eighth subtransverse, shorter and wider than the preceding joints, ninth-eleventh still wider and forming a club, the length of which is equal to the six preceding joints combined, eleventh as long as eighth-tenth combined. *Prothorax* feebly transverse, strongly convex, sides strongly rounded, but with somewhat sinuous outlines; with dense and rather coarse, but partially-concealed, punctures. *Elytra* about four times the length of prothorax, parallel-sided to near the apex, strongly convex, interstices rather strongly elevated, the alternate ones somewhat wider than the others; striæ with fairly large, but more or less concealed, punctures. *Under surface* with dense, rather small, and partially-concealed punctures. *Legs* rather short. Length (including rostrum), 22 mm.

Hab.—Western Australia: King George's Sound (type in Macleay Museum).

In general appearance something like the female of *Eurhynchus lævior*, but differs in being larger, prothorax much wider, rostrum straighter, second joint of antennæ longer, instead of shorter, than third, etc.

There are two specimens (sexes) of this species in the Australian Museum; the male differs from the female in being smaller, with the rostrum shorter, stouter, and more coarsely punctured. The antennæ are inserted closer to apex of rostrum, the second-ninth joints are provided with wide, flange-like extensions, rather than rami, the tenth is also produced, but in profile appears triangular (the second-tenth on the produced parts are hairy), the eleventh is almost the length of the three preceding combined, narrower than any of the others, and constricted and strongly curved just before the middle. The extensions of the antennæ are much shorter than in *porcellus*, and are longest at about the middle, instead of gradually elongating to the ninth, the eleventh is longer than in *porcellus*, but otherwise much the same.

This genus has hitherto been known only from the male of *C. porcellus;* but the examination of both sexes of the present species suggests to me the possibility that *Ctenaphides* should be regarded as a subgenus of *Eurhynchus* only. There are certainly no generic features by which the females of it and of *Eurhynchus* can be distinguished.

SUB-FAMILY CIONIDES.

Nanophyes.

The peculiar shape and five-jointed funicle render this genus a very distinct one; hitherto but one species has been recorded from Australia.

Nanophyes maurus, Pasc.

There is a specimen before me, from Sydney, which possibly belongs to this species; it differs from the description, however, in having the scape and basal joint of funicle (not flavous, but) of a very dark red, the base and apex of tibiæ are similarly coloured, and the sides of the prothorax in certain lights appear to be diluted with red.

Nanophyes Alleni, n. sp.

Male. Black; base of femora flavous; funicle, scape, base and apex of tibiæ and parts of tarsi of a more or less dull red. Moderately clothed with whitish pubescence, denser on sides of sterna than elsewhere.

Rostrum thin, not quite as long as head and prothorax combined, grooved behind antennæ (which are inserted at apical third) and dilated in front of them, with punctures throughout. *Prothorax* transverse, sub-conical; with sparse partially-concealed punctures. *Elytra* punctate-striate, the interstices regularly convex, and with indistinct punctures. *Femora* bidentate, the large tooth very thin and sharp, the smaller scarcely traceable. Length (excluding rostrum), 2 mm.

Female. Differs in being larger, rostrum fully the length of head and rostrum combined, grooves less distinct, and punctures smaller and sparser, especially towards the apex; the antennæ also are inserted nearer to the middle.

Hab.—Queensland: Cairns (Edmund Allen).

Differs from the preceding species by its slightly larger size, longer rostrum, and very decidedly longer femoral teeth. The clothing on the elytra of five specimens shows no tendency whatever to form a V.

Nanophyes V-notatus, n. sp.

Female. Black; base of femora flavous, tibiæ almost flavous, but slightly infuscate in middle; scape, funicle, and parts of tarsi of a dull red. Clothed with greyish pubescence, denser on sides of sterna than elsewhere, and forming a distinct V on elytra.

Rostrum thin, the length of head and prothorax combined, with a few feeble punctures in front of antennæ (which are inserted at apical two-fifths), but with distinct punctures and grooves behind. *Femora* as in the preceding species. Length, 2 mm.

Hab.—New South Wales: Nepean River (A. J. Coates), Sydney (H. J. Carter).

Readily distinguished from *maurus* and *Alleni* by the white elytral V; the arms of this commence near each shoulder and become conjoined on suture before the middle. A somewhat abraded male, evidently belonging to this species, differs in having the rostrum shorter, stouter, more coarsely punctured, and with the antennæ inserted closer to the apex.

I have not described the prothorax and elytra in this and the two following species, as they are much the same as in *Alleni*.

NANOPHYES NIGROVARIUS, n. sp.

Flavous, in places becoming dull-red; head, club, meso- and metasternum and abdomen black or blackish, base of rostrum and funicle more or less infuscate. Clothed with whitish pubescence, denser on sides of sterna and of abdomen than elsewhere, and with a tendency to form a V on the elytra.

Rostrum and antennæ of both sexes much as in *Alleni*, and *femora* the same. Length, 2-2¼ mm.

Hab.—New South Wales: Nepean River (A. J. Coates), Clarence River (A. M. Lea).

The elytral V is in the same position as in the preceding species, but is not quite so pronounced.

A specimen from Brisbane is probably a variety; it differs in being dull red, in having the rostrum entirely black, the suture black at the base (in one of the types it is infuscate at the base), and the sides of the elytra and middle of femora infuscate.

NANOPHYES PALLIDICORNIS, n. sp.

Female(?). Flavous; in places slightly reddish or slightly infuscated. Sparsely clothed with greyish pubescence, and forming a feeble V on elytra.

Rostrum thin, parallel-sided, slightly longer than prothorax, with grooves and punctures behind, and a few punctures in front of antennæ, these inserted at apical two-fifths. *Femora* very feebly bidentate. Length, 1½ mm.

Hab.—New South Wales (Macleay Museum): Forest Reefs (A. M. Lea).

Smaller and wider than any other species tabulated below. The pale club and under surface will readily distinguish it from *nigrovarius*; the elytral V is no more conspicuous than in that species, but on one of the specimens there is a faint row of slightly-darkened spots before and another behind it; on the second specimen the posterior spots are wanting.

Prothorax and elytra black.
  Elytra with pubescence forming a distinct V ... ... *V-notatus*, n. sp.
  Elytra without such a V.
    Femoral dentition feeble ... ... *maurus*, Pasc.(?)
    Femoral dentition acute ... ... *Alleni*, n. sp.
Prothorax and elytra not black.
  Sterna and abdomen more or less black ... *nigrovarius*, n. sp.
  Sterna and abdomen pale ... ... *pallidicornis*, n. sp.

New Australian Lepidoptera, with Synonymic Notes.—No. XXIV.

By Oswald B. Lower, F.Z.S., F.E.S., etc.

[Read July 2, 1907.]

RHOPALOCERA.

LIBYTHEIDÆ.

* Libythea geoffroyi, Godt.

Enc.: Meth. ix. Suppl. p. 813 (1823); Wallace, Trans Ent. Soc., 1869, p. 335, n. 4. *L. nicevillei*, Oll., P.L.S., N.S.W., 1891, p. 28.

This insect is comparatively rare in Australia, and I have seen but two females. The male, however, is not so rare. The sexes are very dissimilar, the male being tawny-yellow, with several large semi-transparent wing-spots, whilst the female is a beautiful lilac-blue, almost devoid of markings. Having recently received a female from North Queensland, I thought it would be wise to correct the nomenclature. The male varies somewhat, and is known under the various names of var. *antipoda*, Boisd., var. *ceramensis*, Wall, and var. *Batchiana*, Wall. It has a range extending to Ceram, Batchian, New Caledonia, etc. I have not yet heard of it being taken in New Guinea, although it should occur there.

Telesto monotherm, n. sp.

Female, 40 mm. Head dark fuscous, spotted with ochreous-white. Post-orbital rims whitish. Antennæ fuscous, faintly spotted with ochreous-whitish. Palpi fuscous, beneath whitish. Legs dark fuscous, posterior tibiæ whitish. Abdomen fuscous, ringed narrowly with ochreous-white, beneath more whitish. Forewings rather elongate triangular, costa slightly arched towards base; dark fuscous, without markings; cilia dark fuscous. Hindwings with termen rounded; colour and cilia as in forewings, basal hairs orange; a narrow median band of orange not near reaching either margin. Underside of forewings dark fuscous, paler on dorsal half; an oblique row of four somewhat confluent whitish dots, from costa at three-quarters; a moderate, short, whitish fascia, from costa near apex to vein four, narrow on costa and much dilated on lower half, both edges scalloped; a small whitish spot on costa just before fascia; a row of whitish dots along termen. Hindwings whitish, markings blackish; an oval spot on costa close to base; two similar on costa just before middle, only separated from each other by vein; two others, much smaller, placed one below the other, immediately below costa at three-quarters; a roundish spot in cell, a larger one at posterior end, and an elongate one lying below lower edge of cell near base; three

*In Miskin's Catalogue this insect is called *L. myrrha*, Godt.

somewhat cartridge-shaped spots, separated by veins in disc at two-thirds from base in a line with those on costa at three-quarters; a very large darker spot between veins one and two, almost touching an elongate dorsal patch of fuscous; an irregular row of spots along termen median, two largest, absent between veins five and six; cilia fuscous chequered with whitish.

Kuranda (Dodd) and Mareeba (Stewart), North Queensland. Two specimens; in September and October.

ERYNNIS AMALIA, Semp.

Pamphila amalia, Semp. Mus. Godf., Lep. xiv., 1878; *Hesperilla fulgidus*, Misk., P.R.S.Q., 151, 1889; *Erynnis fulgida*, M. and L., T.R.S.S.A., 116, 1902.

With the assistance and generosity of Col. Chas. Swinhoe, M.A., and Prof. K. Kraepelin, of the Hamburg Museum, I have been enabled to recognize this species. The former sent me an admirable drawing, the latter an excellent description.

HETEROCERA.

ARCTIADÆ.

SPILOSOMA (?) COSMETA, n. sp.

Male, 30 mm. Head and thorax dull ochreous. Palpi and antennæ black. Legs orange-ochreous, tibiæ and tarsi fuscous. Abdomen orange or reddish-orange, a dorsal and lateral series of dark fuscous spots throughout. Forewings elongate, moderate, costa nearly straight, termen rounded, oblique; dull ochreous, with blackish markings, all veins more or less outlined with fuscous; three dentate, moderately-thick fasciæ; first from costa at about one-quarter to one-quarter (inner margin), curved outwards and slightly angulated above middle; second similar from costa beyond middle to inner margin at middle; third much thicker and better defined, from costa at five-sixths to anal angle; a suffused discal dot between first and second fasciæ, sometimes obscure; a moderately-broad, blackish band along termen, not quite reaching anal angle; containing half-a-dozen elongate streaks of ground-colour on veins; cilia dark fuscous. Hindwings with termen round; pale orange-yellow; a moderately large black discal dot; a broad blackish band along termen, containing a small patch of ground-colour in middle; cilia orange-yellow, on apical half fuscous.

Broken Hill, New South Wales. Several specimens; in May.

This species closely resembles *S. fuscinula*, but is very constant, and is at once recognized by the shorter pectinations of the antennæ. I am very strongly inclined to think that the female will prove to be apterous, as during many years of searching I have never met with anything but male specimens, and I have searched for the female in vain. Should this prove to be so, then a new genus will be required to receive it.

GEOMETRINA.

MONOCTENIADÆ.

HYPOGRAPHA EREMŒA, n. sp.

Male, 30 mm. Head, palpi, thorax, and legs ashy-grey-whitish. Abdomen ochreous. Antennæ fuscous. Pectinations ochreous-fuscous. Forewings elongate moderate, somewhat triangular, costa nearly straight, termen oblique, rounded; ashy-grey-whitish; a waved, angulated, black line from costa at one-third to inner margin at one-third; a second, similar, from costa at five-sixths to inner margin at two-thirds; a black line along termen, interrupted at extremities of veins: cilia cinerous-grey, with blackish points at extremities of veins. Hindwings with termen rounded; whitish; a pale fuscous band along termen, edged above by two waved, parallel, pale-fuscous lines, which reach both margins, but become blackish on dorsum, as also does the band along termen; cilia white with fuscous spots at extremities of veins.

Townsville, Queensland. Two specimens, from Mr. F. P. Dodd; taken in January.

SELIDOSEMIDÆ.

AMELORA POLYCHROA, n. sp.

Male, 30 mm. Head and face whitish. Thorax whitish mixed with ochreous and ferruginous fuscous, antennæ ochreous, pectinations ochreous, six. Abdomen pale ochreous. Legs pale whitish-ochreous, tibiæ and tarsi banded with blackish. Forewings elongate-triangular, termen bowed-oblique; dull-whitish, thickly and irregularly strewn with blackish, ferruginous and fuscous scales, which form an irregular outwards-curved fascia from costa at one-quarter to dorsum at one-quarter; a moderately straight, dentate-edged, fuscous fascia from costa at five-sixths to near anal angle, preceded by a larger quadrate, fuscous, discal dot; an irregular fuscous sub-terminal line; all veins more or less outlined with ferruginous-ochreous; cilia white, barred with fuscous between veins. Hindwings whitish, terminal half more or less irrorated with light ferruginous scales, becoming thicker on terminal portion; a pale fuscous discal spot; cilia white. Probably nearest *arotræa*, Meyr.

Derby, Western Australia. Two specimens; in November.

PYRALIDINA.

GALLERIADÆ.

MELISSOBLAPTES SPODOPTERA, n. sp.

Female, 16 mm. Head, thorax, and antennæ dull grey-whitish. Abdomen greyish-ochreous. Legs greyish. Forewings elongate, moderate, costa moderately arched, termen rounded, oblique; dull whitish, irrorated with light fuscous, somewhat more pronounced in cell and on costa; an outwards-curved, fuscous line from costa at two-thirds to dorsum at two-thirds; a row of fuscous dots along termen; cilia grey-whitish, with a fuscous median line. Hindwings and cilia grey.

Townsville (Dodd) and Cooktown. Four specimens; in September and August.

MUCIALLA LEUCOSPILA, n. sp.

Male, 15 mm. Head and thorax ashy-grey-whitish, mixed with some ferruginous ochreous-scales. Antennæ fuscous. Legs and abdomen grey-whitish. Forewings elongate, moderate, costa gently arched, termen obliquely rounded; ashy-grey-whitish, more or less irrorated with fine blackish scales and scattered ferruginous scales; an obscure ferruginous patch, at patch followed by a whitish spot on costa at one-fifth; a fine, irregular, fuscous line from costa beyond white spot to dorsum at one-third, indented above dorsum, a similar but very suffused line from costa at five-sixths to dorsum at anal angle; one or two fine black marks at end of cell; three blackish spots on costa near apex; a row of suffused fuscous spots along termen; cilia grey, becoming fuscous on terminal half. Hindwings light fuscous; cilia greyish, becoming fuscous on terminal half.

North Queensland. One specimen.

MUCIALLA MACROMORPHA, n. sp.

Male, 20 mm. Head, palpi, and thorax dull-reddish-fuscous, thickly sprinkled with dull white. Abdomen grey. Antennæ grey. Legs and abdomen grey-whitish. Forewings elongate, moderate, costa hardly arched, termen rounded, oblique; dull reddish-fuscous, thickly irrorated with very minute whitish and black scales; veins very obscurely outlined with darker towards termen; cilia dull reddish-fuscous, with a fuscous sub-basal line.

North Queensland. One specimen.

MUCIALLA CRYPSIMERA, n. sp.

Male, 16-18. Head, palpi, thorax, and antennæ ashy-grey-fuscous. Legs grey, abdomen silvery-grey. Forewings elongate, moderate, costa gently arched, termen rounded, oblique; ashy-grey-fuscous, sometimes thickly mixed with whitish, all veins more or less outlined in black, sometimes obscure; indications of two fuscous fasciæ somewhat oblique, both reaching from costa to fold at middle and two-thirds; a row of more or less confluent fuscous spots along termen; cilia ashy-grey, with fuscous submedian and subterminal lines. Hindwings grey, tinged with fuscous; cilia grey, with a fuscous sub-basal line.

North Queensland. Two specimens; in March.

Notes on South Australian Decapod Crustacea Part V.

By W. H. Baker.

[Read July 2, 1907.]

Plates XXIII. to XXV.

The species here dealt with are of a very varied character, and several of them are submitted with a good deal of diffidence. The two species of *Pinnoteres* are established chiefly on the fact of the absence of the dactylus of the external maxillipeds. I have not attempted to figure *P. subglobosa*, on account of its untoward shape; it would appear to be deeper sunken in parasitism than other members of the same genus.

With regard to the two species of *Processa*, while they are sufficiently distinguished from each other, I must confess that I have not been able to compare them with any foreign species.

Very few species of the actively-swimming crustacea are known from the southern coast of Australia, there not having been any systematic attempts to collect them. We are looking forward to results from the efforts which are about to be made by the Federal Government in the direction of trawling.

I wish to express my sorrow at the death of Mr. F. E. Grant, F.L.S., of Sydney, which took place in January last. I owe him for many good services, especially in relation to references I could not make myself.

Order BRACHYURA.

Tribe CYCLOMETOPA.

Family Xanthidæ.

Sub-Family Xanthinæ.

Genus *Cycloxanthus (?)*, A. Milne Edw.

Cycloxanthus (?) carinatus, n. sp. Pl. xxiii., fig. 1.

The body is almost totally glabrous.

The carapace is considerably broader than long, not very convex, the surface is uneven, the regions very indistinctly indicated, covered with numerous minute punctations amongst which larger pits are scattered, which are more numerous on the antero-lateral margins and the front.

The front is more than one-third the width of the carapace; it is strongly arched, lamellar, cristate, and projects far beyond the eyes, and is transversely sinuate and obliquely depressed; its outer ends have distinct closed incisions, but there is no sign of a median notch.

The antero-lateral margins are arcuate, much longer than the postero-lateral, cristate, thin, and divided into four lobes by distinct notches. The postero-lateral margins are concave and much converging, making the sharply-accentuated posterior margin narrow.

The sub-orbital and pterygostomial regions are granular, as also is the epistome and basal joints of the antennæ.

The sternal plastron is punctated.

The pleon of the male is narrow, five-segmented, the first two segments occupying all the space between the last pair of legs, the three coalesced segments are wider at the base and tapering, the last segment is a small truncated triangle.

The orbits are oval, rather small, with two closed incisions above and one below near the exterior angle, the internal sub-ocular angle is only slightly accentuated. The ocular peduncles are much curved, do not fill the orbits, and each has a small tubercle close to the eye.

The fossettes are slightly oblique beneath the strongly over-arching front; the basal joint of the antennule has a strong oblique lip-like ridge.

The epistome is narrow and sunken, anteriorly it is continuous with the interantennulary septum, an oblique line traverses it from the bases of the antennæ, becoming obliterated medianly.

The basal joint of the antenna is very oblique and tightly wedged in between the sub-frontal thickening and the subocular region, its distal anterior half is cut away on account of this thickening, the end reaches the sub-ocular angle. The remaining joints and the flagellum are very small and lie in the orbit.

The buccal frame is subquadrate, its anterior margin is somewhat arched and is somewhat sunken, dipping a little in the middle: it has a median and two lateral closed incisions.

The external maxillipeds completely close the buccal orifice. The merus is granular, with a depression on the external surface, subquadrate, with the internal distal angle truncated and the distal margin slightly oblique; it is about half as long as the ischium, the division-line between them having an insinuation: the ischium is less granular and somewhat punctate, and has a longitudinal groove. The exopod nearly reaches the external angle of the merus.

The chelipeds are robust, the merus is trigonous, not reaching as far as the margin of the carapace; its upper edge bears some irregular tubercles and a few coarse hairs. The carpus is rounded above; its surface, like the upper surface of the palm, is strongly reticulate, caused by anastomosing strings of densely-packed granules and pits; there is a small tubercle on the inner angle. The palm is moderately compressed, rounded externally, and abruptly declivous and smooth internally, carinate above and below. The fingers are strongly compressed and carinate, the immobile one is strongly toothed, the mobile one less so, there is a small hiatus between them, they are slightly hooked, and not excavated at the tips.

The ambulatory legs are much shorter than the chelipeds, the joints much compressed, expanded, and carinate, the meri are trigonous, the dactyli are straight, five or six carinate strongly, with the claws sharp and slightly curved.

Length	of	carapace,	20 mm.
Breadth	,,	,,	26 mm.
Length	of	cheliped,	25 mm.
,,	,,	first leg,	21 mm.

Males only, from Port Willunga, Mr. W. J. Kimber, Port Lincoln.

C.(?) punctatus, Haswell, which does not bear a detailed description, differs from the present species in the following points:—The carapace is more convex and polished, with the regions more strongly defined; the front and antero-lateral margins are much thicker and not cristate, and there are no incisions on the outer ends of the front; this also projects rather more, and is slightly pointed. An oblique and sinuous groove extending from the second antero-lateral notch across to the strong depression behind the gastric region is well-marked. The posterior margin is thickened, without being sharply defined. The subocular regions are nearly smooth; the sternal plastron much more deeply pitted. The merus of the external maxillipeds is about one-third the length of the ischium, with the distal margin much more oblique; the merus also is nearly smooth, marked with a narrow pit externally. The groove of the ischium is nearly obsolete. The chelipeds are nearly smooth in comparison, and not carinate. The ambulatory legs are scarcely compressed, and non-carinate, while the dactyli are sub-cylindrical, being marked with longitudinal lines of pits, the interspaces between which, however, may assume a carinate form.

I agree with Messrs. Fulton and Grant (Proc. Roy. Soc. Victoria, 19 N.S., pt. i., p. 6) that this species should not be retained in the genus *Cycloxanthus*, but am unable to agree that its place is in *Lioxantho*, Alcock—where they doubtfully put it—not being able to examine any species of that genus.

Tribe CATAMETOPA.

Family GONOPLACIDÆ.

Sub-family, RHIZOPINÆ.

Genus *Ceratoplax*, Stimpson.

Ceratoplax punctata, n. sp. Pl. xxiii., figs. 2, 2*a*, 2*b*.

Body rather thick.

The carapace is broader than long, very convex in the antero-posterior direction, much less so in the transverse; smooth, polished, and, except on the margins, glabrous with scattered pits; two of these, situated about the middle, and rather distant apart, are more conspicuous, and below them is a faint marking of a broad H in pits; behind this, on each side of the intestinal region, is a small area of wrinkles.

The front is almost vertically depressed, less than one-third the width of the carapace rounded at the external ends, and medianly a little insinuate and slightly notched. The antero-lateral margins are slightly cristate, obscurely lobed by two or three faint notches, shorter than the postero-lateral margins. Postero-lateral margins nearly parallel. Posterior margin broadly arcuate and raised to a ridge. Except on the posterior margin the carapace has a dense fringe of long cilia, which traverses the ocular peduncles; beneath the fringe the surface is more or less granulate. The orbits are moderately large and excavated into the upper surface; they are also somewhat elongated. The ocular peduncles almost completely fill them, and are levelled off to be nearly flush with the sub-ocular surface; the internal sub-ocular angle is not produced. The eye is narrow and slit-like.

The antennules which fold transversely are partially hidden by the front.

The basal joints of the antennæ close the hiatuses of the orbits and extend beyond the sub-ocular angles, but scarcely reach the front; the second joints extend a little beyond the front.

The epistome is narrow—transverse.

The sub-ocular and pterygostomial regions are slightly concave or flat.

The external maxillipeds are very hairy and almost close the buccal orifice; the ischium is slightly sulcated longitudinally and jointed to the merus obliquely-straight. The merus is sub-quadrate, with its internal distal angle not much truncated, the distal margin slightly insinuated; much produced with a rounded lobe at the external distal angle, that portion covering the end of the exopod. The succeeding joint is articulated at the inner angle of the merus. The exopod is broad.

The chelipeds are short, equal, and densely hairy on the margins. The merus has a small tubercle on the upper margin. The carpus has the internal angle obtusely projecting, with a small area of granules close to it on the upper surface. The hand is short, very much compressed, its external surface marked by a few rather coarse granules inclined to become spinuliform; the lower margin is strongly carinate, the carina granulate, the upper margin is obtuse. The fingers are much compressed, shorter than the palm, not meeting, except at their tips, the mobile one sulcate, and with a cluster of granules above at the proximal end; the immobile one slightly toothed.

The ambulatory legs are moderately long, longer than the chelipeds; the first pair is shorter than the others, these being sub-equal in length; all the exposed margins of the joints are densely hairy; the propodi have longitudinal sulcations and some pits on their anterior and posterior surfaces; the dactyli are stiliform, and rather shorter than the propodi, almost totally covered with short fur and some long hair.

The pleon is fringed as the other parts, and scarcely pitted; seven-segmented, the basal segments not nearly covering the sternal plates; the first segment is drawn out to a point on each side, and the terminal one shovel-shaped.

Length of carapace, 12 mm.
Breadth ,, ,, 16 mm.

One female in the museum collection, which I describe as belonging to the southern coast, on the strength of having received from Mr. H. Flecker a carapace, which undoubtedly belongs to it, from Edithburg, the type I received from the Museum; locality doubtful.

Family, PINNOTERIDÆ.

Sub-Family, PINNOTERINÆ.

Genus, *Pinnoteres*, Latreille.

Pinnoteres holothuriensis, n. sp. Pl. xxiii., figs. 3, 3*a*.

The integument is of firm consistence.

The carapace is broadly ovate or subcircular, smooth, glabrous, convex in both directions, with the regions not defined, ornamented with dark lines, which are chiefly meridional, which extend below to the lateral regions, slightly depressed between the gastric region and the front, also in the metabranchial regions. Front advanced a little beyond the eyes, about one-third the width of the carapace showing arcuate above but depressed to a V shape between the fossettes. Lateral margins faintly defined.

The sternal plastron is hairy at the border, which limits the end of the pleon, and at the bases of the chelipeds.

The pleon of the male slightly tapers from the third segment, the second segment is very short, the last four subequal in length. The pleon of the female is fringed with hairs.

The orbits are circular, completely filled by the ocular peduncles. The eyes are well pigmented.

The fossettes are subcircular, large, and occupy almost all the interocular space, there being a very thin septum between each.

The antennæ are very small.

The epistome is narrow, transverse, and a little sunken.

The buccal frame is transversely broad; its upper margin shows four shallow arches with a small median V-shaped point.

The external maxillipeds are slightly pubescent, and are without sutural line in distinguishing the ischium from the merus; they completely close the buccal cavity. The palp consists only of the carpus and propodus, there being no dactylus; the propodus is hatchet-shaped, and the carpus has on the inner side a tuft of hair at the distal end, which reaches nearly to the end of the propodus. The exopod is compressed and hidden.

The chelipeds are well developed in both sexes, longer than the legs, unarmed, smooth; the merus is trigonous, the carpus is rounded above with a tuft of short hairs at the inner angle, the palm is scarcely compressed, vertically narrow at the proximal end, the upper margin ascending to the base of the mobile finger, it is hairy on the lower border. The fingers are nearly as long as the palm, not gaping, curved, or hooked at the tips, especially the mobile one, minutely toothed on the inner margin, with one or two larger teeth.

The ambulatory legs are scarcely compressed, unarmed, and not different notably in length; the carpi and propodi of the second and third pairs with a fringe of hairs on the lower margins, and the propodi with a fringe near the upper margins, continued on the posterior surfaces of the carpi in an oblique line, the first and last pairs are less hairy. The dactyli are rather short, strong, curved, with sharp, slender claws, and more or less hairy on their inner margins.

Specimens found inside holothurians and ascidians; those from ascidians are smaller, but without specific difference. This crab is able to swim, and probably does not spend all its time within the host.

Length of carapace, 10 mm.

,, of cheliped, 11 mm.

Dredged by Dr. Verco, 12 fathoms, St. Vincent Gulf. Ascidian specimens from 5 fathoms.

Pinnoteres subglobosa, n. sp.

The body is soft, subglobose, or slightly quadrate owing to the swollen body, the pleon loaded with ova having a greater bulk than the thorax, destitute of hairs except on the margin of the sternal plastron, which limits the pleon anteriorly, and a few on the lower margins of the palms of the chelipeds.

The carapace is very convex, much depressed anteriorly, the front truncate, and very scarcely in advance of the eyes, nearly straight and less than one-third the width of the carapace. The pleon is very large and cup-like, and slightly umbonate medianly.

The orbits and fossettes are smaller than those of the preceding species, and the septum between the fossettes is thicker.

The eyes are almost destitute of pigment.

The buccal frame and external maxillipeds also are similar in shape to the preceding species, except that in the maxillipeds the propodus is less expanded and setose, the dactylus also is wanting.

The chelipeds are slender, not much more robust than the ambulatory legs, scarcely compressed; the merus is cylindrical and curved, the carpus not much shorter than it, the palm widens slightly in the vertical direction towards the distal end. The fingers are rather more than half as long as the palm, slightly gaping, scarcely hooked, with very small teeth, and one or two larger ones near the proximal ends.

The ambulatory legs do not differ much in length, the first pair is rather shorter than the chelipeds, the dactyli are strongly curved.

The ova are small and very numerous.

This species was found in pectens.

Dredged by Dr. Verco, 17 fathoms, S.A. coast.

Order, BRACHYURA, PRIMIGENIA, or DROMIACEA.

Tribe, DROMIIDEA.

Family, Dromiidæ.

Genus, *Dromia*, Fabr.

Dromia octodentata, Haswell. Pl. xxiii., fig. 4.

Dromia octodentata, Haswell, Cat. Aust. Crust., p. 140.

I find in this species that the characteristic teeth of the antero-lateral border are variable in position, and that frequently there is an extra tuberculiform tooth just anterior to the last, but in the same slightly-curved line with the others.

The body is covered with a very harsh tomentum of barbed hairs, and is indeed very hirsute on the chelipeds and legs in large specimens; the hairs are, however, very scanty on the carapace, and when rubbed off leave the surface polished and marked with minute pits.

The carapace is pentagonal in outline and very convex; there is a slight median groove extending from the front a little back, and another wider and oblique proceeding from the interval between the external angle of the orbit and the first antero-lateral tooth. In some specimens a longitudinal indentation exists on each side of the cardiac region, but the cervical groove is very indistinctly marked.

There is a tooth about the middle of the upper orbital border and another close to the external angle, the angle itself is occupied by a V-shaped notch.

Two teeth are on the external angle of the buccal frame, the anterior one of which is covered with granules.

The epistome is sunken.

The basal joints of the antennæ lie slightly obliquely towards the middle line.

The internal margins of the ischium and merus of the exterior maxillipeds bear a row of granules or spinules.

A rather common species. S.A. coast.

Genus, *Dromia*, Fabr.

Sub-genus, *Cryptodromia*, Stimpson.

Cryptodromia depressa, n. sp. Pl. xxv., figs. 1, 1*a*, 1*b*.

The body has a harsh, short, brown tomentum, which is spare or absent on the surface of the carapace and exposed parts.

The carapace is slightly broader than long, subpentagonal in outline, a little uneven behind, with the cervical groove well marked, smooth, except for a few small tubercles near the antero-lateral borders and orbits. The front is composed of two prominent obliquely compressed processes with a median one, which is small, depressed, and obtuse, not visible from above; there is a supra-orbital tooth and another at the external angle of the orbit. The antero-lateral margins are arched and somewhat cristate—being a little excavate underneath—nearly in the same line with the orbital and frontal teeth when viewed horizontally; they are marked by one large compressed tooth, followed by four or five of varying size, somewhat irregularly placed, one of which is on the posterior side of the cervical notch. The postero-lateral margins scarcely converge, there is a slight insinuation behind the cervical notch. The posterior margin is broad and marked by a sinuate ridge.

The lower orbital border is composed of two compressed tubercles, with a deep notch between the outer one and the external angle. The suborbital region is marked by 6-9 small, scattered papilliform tubercles. Two oblique, compressed, and prominent tubercles form the external angle of the buccal frame, while the front border of the buccal frame is horizontal and cut by two deep narrow notches and a small median one.

The first peduncular joint of the antennæ is large and nodular, with two distal projections, the outer one throwing out a branch behind over the base of the ocular peduncle; the next two joints are of moderate width and the flagellum is small.

The epistome is sunken, very narrow in the longitudinal direction, with a triangular process above, the apex of which projects a little and meets a process of the front.

The chelipeds are moderately robust—rather more so in the male—the carpus and propodus are scarcely compressed and are very irregularly nodular; the merus is trigonous, its upper edge bears some small, irregular tubercles, with a large nodular tubercle near the distal end; the carpus and palm are subequal in length. The fingers are broadly excavate, their outer margins provided with strong interlocking teeth. The mobile finger has a deep groove filled with hair on the outer side, the immobile one is grooved on both sides, making the lower border carinate.

The first and second pairs of legs are nearly equal in size, they are robust and nodular, the meri having strong distal tubercles on the upper margins. The meri, carpi, and propodi are subequal in length, the dactyli are strongly spined. The third and fourth pairs are a little roughened, but not nodular, the third is considerably shorter than the fourth, with very short propodi bearing each four or five distal, slightly-curved spines, two of which are opposed to each dactylus; the dactyli are strong and much curved. The fourth pair is similarly spined.

The pleon of the male has the first segment laterally produced to a point on each side, the second has the shape of a truncated triangle, the third, fourth, fifth, and sixth have the median ridge with transverse depressions, thus presenting in each case an anterior and posterior tubercle, the distal angles of each of these segments are strongly emphasized, the terminal segment is triangular. The pleon is covered with scattered papilliform tubercles.

The sternal sulci of the female reach, and are deeply cut into, a transverse prominence or tubercle, which is situated quite between the coxæ of the chelipeds.

Length of carapace, 21 mm.
Breadth „ „ 22 mm.
Length of cheliped, 28 mm.
„ „ first leg, 28 mm.

St. Vincent Gulf. Dredged by Dr. Verco. Mr. W. J. Kimber.

Types in Adelaide Museum.

Order MACRURA.

Tribe, THALASSINIDEA.

Family, CALLIANASSIDÆ.

Borradaile, Ann. and Mag. Nat. Hist. Ser. 7, vol. xii.

Genus, *Callianassa*, Leach.

Sub-genus, *Callichirus*, Stimp.

Callianassa æquimana, n. sp. Pl. xxiv., figs. 1-8.

The carapace is considerably less than one-third the length of the body, excluding the telson, mostly smooth and firm, a little punctate on the protogastric region, somewhat elevated in the median regions. The cervical groove is well marked, its posterior border reaches back a little further than the middle of the carapace. A little behind this the carapace is marked by a transverse suture, which soon sends a branch forward in a straight line to the antennal notch and another backward to the posterior margin; the transverse suture is continued on to the branchiostegite, where it ends in numerous small areolæ; from this point lines extend forwards and backwards, the forward line takes a slightly oblique and sinuous course to a point below the antennal notch; in crossing the subhepatic region it is ridge-like, below this ridge are also numerous areolæ.

The front has a very slight rostral projection, and behind it two short longitudinal grooves, more or less well marked, diverge, and are soon lost, more prominent are projections of the margin below the ocular peduncles; the antennal notch has a small lunate suture or ridge just behind it, the antero-lateral angles are rounded; in some specimens a short furrow runs obliquely on the side of the metagastric region and the upper portion of the hepatic region is somewhat uneven and punctate; the branchiostegites scarcely project behind.

The postero-lateral expansions of the pleon segments are small; the first segment is anteriorly narrowed and subcylindrical, its pleura being obsolete; the second segment, which is the longest, is produced postero-laterally to a greater degree than the three which follow. The first, third, and fifth segments are subequal in length, and the fourth shortest, the sides of the third, fourth, fifth, and sixth segments have short transverse grooves or depressions, each of which carry a line of fine hairs, otherwise the pleon is nearly glabrous. The sixth segment tapers a little from near the anterior end, and there are two well-marked projections on the lateral margin; the posterior margin is slightly arcuate.

The telson is short, about twice as broad as long, it bears on its anterior half a sharp, transverse ridge, notched in the middle, the ends not reaching the lateral margin, the posterior margin is strongly insinuated and devoid of cilia, except one or two long ones near each posterior angle.

The ocular peduncles are much longer than broad, slightly flattened above, and distally pointed, the inner margins parallel and close together for nearly their whole length, the outer strongly curved. The eyes are small and subapical.

The antennules have the first peduncular joint scarcely reaching the end of the ocular peduncle, the second joint is nearly twice as long as the third, the flagella are equal in length and are longer than the peduncle, the lower one is setose, the upper nearly naked, except at its end.

The antennal peduncle exceeds in length that of the antennule, the first joint has the aperture of the green gland projecting, the second joint reaches to the level of the eye, the third joint is small, distinct below, but on its upper surface is a small, circular plate, which may be a rudimentary scale, the fourth joint is long, the fifth joint is about two-thirds the length of the fourth, the flagellum is long, slender, and not setose.

The external maxillipeds have the ischium and merus expanded, subequal, and together operculiform, their outer surfaces are flat for the most part, the line of articulation is curved, both are fringed with setæ on the inner margins, the ischium has a short oblique ridge near its base bearing a few hairs, the apex of the merus is thickened and obliquely truncated just behind the articulation of the carpus; the inner surface of the two joints has a longitudinal ridge about the middle, bearing on the ischium minute white teeth which are not noticeable on the merus. The next three joints are setose and together longer than the ischium and merus together: of these the carpus is the longest and is not much expanded below, but the propodus is expanded to a large lobe on that side, the terminal joint is compressed, rather broad, and distally rounded and hairy.

The chelipeds are nearly equal, the ischium is compressed with a faint longitudinal ridge on the outer surface, and one or two small teeth at the distal end of the lower margin, the merus is smooth, slightly longer than the ischium, with a faint, sigmoid ridge on the outer surface. The carpus and propodus are deep, compressed, and strongly carinate on the upper and lower margins, externally convex and smooth, the inner side is excavate and a little tumid in the middle. The lower carina of the propodus is thickened behind, and defines a groove on the outer side. The palm is longer than the carpus, proximally slightly deeper, it tapers a little, it has a few small fascicles of hairs near the lower border, and near the upper margin is a row of pits carrying hairs, its lower margin bears a fringe of rather long hairs springing from just inside the margin—the lower anterior angle of the carpus also has a tuft of hairs—a short ridge extends from about the middle of the immobile finger backward for a short distance. The fingers are about half as long as the palm, sharp overlapping at their apices with a small hiatus when in that position, the mobile finger is without teeth and bears some fascicles of hair above and below, the immobile finger has a tooth about the middle, with a few denticles proximally from it.

The following two pairs of legs are rather short, compressed, and stout. Of these the first has the palm of the propodus very short, and the fingers, when closed, have no hiatus or teeth, the limb is setose on the margins of the joints. The carpus of the second pair is distally broad, with a tuft of long hairs on its posterior angle, and a fringe on the distal margin, the propodus is subtrianglar and compressed, its outer surface bears many hairs in fascicles, as also does the small, compressed dactylus.

The next two pairs of legs are longer and slenderer, reaching forward to the base of the maxillipeds, in the first of these the coxa is very much expanded, the propodus is compressed and thin, but not much expanded, and with the dactylus is very setose. The last pair is subchelate, the propodus and dactylus bearing an elegant brush of hairs.

The sternal aspect shows the coxæ of the first three pairs of pereiopods close together in the middle line, but the fourth pair are separated by an apparatus which is best shown by the figure, the fifth pair are wide apart.

The first two pairs of pleopods are more or less rudimentary or modified in the female—especially the second—to carry the eggs, the three following pairs are strongly developed and foliacious.

The uropods are not so large as in other species of the genus, the outer ramus is large and subtriangular, capable of folding beneath the inner ramus its inner border when in that position, extending some distance under the telson: it has a submarginal curved ridge, which extends from the outer margin about half way across the surface, this and the distal margin are thickly clothed with short hairs, amongst which are shorter and thicker spine-like hairs, which spring from minute sockets; the distal end of the inner ramus also bears a tuft of hairs. The rami reach much further than the telson.

Length, 6 cm. 4 mm.

" of cheliped, 3½ cm.

From Mr. D. T. Redman, Kingston.

Types in Adelaide Museum.

Tribe, CARIDEA.

Legion, POLYCARPINEA.

Family, NIKIDÆ.

Genus, *Processa*, Leach.

Processa australiensis, n. sp. Pl. xxv., figs. 2-2*e*.

The animal is moderately compressed laterally and moderately robust.

The carapace is smooth, well produced latero-posteriorly; it is about equal in length to the first three segments of the pleon. The rostrum is very short—merely a spine—slightly depressed, not reaching to half the length of the ophthalmopods, transversely broad at the base but soon tapering to an acute point, tipped with a few hairs and very obscurely bifid. The antero-lateral borders of the carapace are produced to subacute angles just below the eyes, but there are no spines, the antero-lateral angles are rounded.

The pleon has the second, third, and fourth segments dorsally subequal in length, the rest are shorter. The pleura are moderately deep, that of the first segment is well produced anteriorly, somewhat acutely, and overlapping the carapace, that of the fifth has a small tooth on its lower margin. The posterior angle of the sixth is very acute, and there is a small rounded lobe projecting over the base of the telson.

The antennule has the first joint very much compressed in the vertical direction, curved and excavate, strengthened by a strong keel below, with a transverse fringe of hairs at the upper distal end, it bears a short, broad, lamellar, and truncate stylocerite, whose outer distal angle ends in a small acute tooth, which does not reach to half the length of the joint. The second and third joints are subequal in length, and together are shorter than the first. The upper flagellum has the thickened portion slightly longer than the peduncle, it terminates in a short, slender portion. The lower flagellum is slender and about twice as long as the upper.

The ophthalmopods are large, pyriform, being very slender at the proximal ends, touching each other in advance of the rostrum.

The antenna has a long, narrow scale, truncate at the end, the sides are nearly parallel, reaching a little beyond the antennular peduncle, the external rigid border ends in a small distal spine which scarcely extends beyond the lamellar portion, the fringe is very long. The peduncle reaches about three-fourths the length of the scale. The flagellum is longer than the animal.

The third maxillipeds are very robust, extending forward beyond the upper flagellum of the antennule; of the three joints the first is flattened on the inner side, and its proximal end is narrowed, it is much longer than the two succeeding joints taken together, the second and third joints are subequal in length, slightly setose; the third, which is directed outwards, quickly tapers to a strong, slightly-curved terminal tooth, the inner side bears some strong spines, as also does the distal end of the second joint on the same side. The exopod is small.

The first pair of legs has the chelate one on the right side, it is short and robust; the merus is nearly as long as the carpus and propodus together, the propodus tapers somewhat from the proximal end, the fingers are shorter than the palm, curved, and end in simple sharp claws, which cross each other. In the opposite limb, which is slightly setose, the propodus tapers considerably to a simple, narrow, curved, and sharp dactylus.

The second legs are slender and nearly equal to each other: that on the left has the ischium compressed, long, and apparently divided about the middle, with a slight expansion near the proximal end, tipped with a few recurved setæ. The merus has 5-7 obscure annuli, it is subequal in length with the ischium. The carpus is about one and a half times as long as the merus, multi-jointed, the joints short and nearly equal in length, except the last, and expanding slightly towards the distal end; the propodus is short, the palm being about as long as the last carpal joint, the fingers are about as long as the palm.

The ambulatory legs are long and moderately robust, the carpal joints are as long and sometimes longer than the meri, and longer than the propodi, except, perhaps, in the last pair, the propodi are slightly compressed and furnished with minute hairs behind, the dactyli are short and only slightly curved, simple, and bear two fascicles of minute hairs near the ends. Of these legs the first pair have two spines on the outer side of the ischium and three on the merus. The second has one spine on the ischium and three on the merus, the last of these being near the distal end; these spines are short and are difficult to see, being so closely pressed to the joint as to have almost the nature of scales.

The uropods are longer than the telson, the peduncle is very short, its outer lobe is rounded, the rami are moderately broad, the external margin of the outer one nearly straight, ending in a well-marked tooth with two spines close to it. The division is curved.

The telson is rather narrow, tapering to end in four spines—besides the small teeth at the angles—two each side, the inner ones longer; medianly there are two well-developed plumose setæ. The quadrately-placed spines of the dorsal surface project considerably.

The ova are small and numerous.

Length, omitting rostrum and telson, 16 mm.

,, of carapace, 6 mm.

,, ,, third maxilliped, 9 mm.

South Australian coast.

Types in Adelaide Museum.

Processa gracilis, n. sp. Pl. xxv., figs. 3-3*c*.

The body is slender, the carapace is about as long as the first four segments of the pleon, slightly depressed. The rostrum is short and slender, almost to the base, bears a few hairs at the tip, and projects more than half the distance of the ophthalmopods. The antero-lateral margin bears a small tooth below the eye peduncle, followed by a faint insinuation behind the antennal peduncle, below this the lateral margin quickly slopes backwards.

The segments of the pleon do not differ much in dorsal length, and the pleura are not deep; that of the fifth segment is without a tooth near the posterior angle.

The ophthalmopods are robust, pyriform, but swollen at their bases on the inner sides, then abruptly becoming very narrow at the joint. The eyes are well developed, and do not touch anteriorly.

The antennular peduncle is robust, the first joint vertically compressed and hollowed in the usual manner, the stylocerite is spiniform and well separated from the body of the joint, reaching about three-fourths its length, the second and third joints are subequal in length, the upper flagellum is robust, rather longer than the peduncle, and clothed with dense cilia; the lower flagellum is very slender, and more than twice as long as the upper.

The antennal scale is long, rather narrow, rigid on the external margin, the distal spine scarcely projecting farther than the lamellar portion which is distally truncated, it projects beyond the antennular peduncle. The peduncle reaches more than half the length of the scale, the flagellum is slender and long.

The third maxillipeds are similar to those of the preceding species, reaching forward nearly as far as the upper flagellum of the antennule.

The first pair of legs are strong, with the chelate limb on the right side, in this the merus is longer than the carpus and propodus together, the carpus is short, the palm a little longer than the carpus, the fingers are shorter than the palm, they are acute and simple. On the opposite limb the propodus tapers much, and is slightly longer than that of the right side, and slightly setose, the dactylus is short, sharp, and curved.

The second legs are very slender, the ischium joints are considerably more expanded than in the preceding species, that of the right side has the ischium and merus subequal in length, the carpus being as long as these two together, very mobile, and composed of about 40 articuli, which do not expand towards the distal end; the limb ends in very minute chelæ. The limb of the left side is shorter and has the carpal joint with about 20 articuli, which become gradually more expanded distally, the propodus and chelæ being well developed. In these limbs the meri have very obscure annulations.

The three pairs of ambulatory legs are long and slender, with—except in the last pair—the carpi slightly longer than the propodi, the propodi have on their anterior margins a close row of very minute and regular hairs, the posterior margins are setose in scattered fascicles. The dactyli are short, simple, and have one or two small fascicles of hairs near the terminal claw, which is minute. The ischii and meri of the two first pairs of these legs are obscurely spined, as in the preceding species.

The pleopods are robust.

The telson is narrow, long, tapering to a narrow end, and on its dorsal surface minutely and sparingly pubescent, the quadrately placed spines are obsolete or nearly so—the terminal spines are broken off in this specimen.

The uropods are about as long as the telson, the outer ramus has its external margin straight, terminating in two small spines; the division, which is well marked, is somewhat arched.

Length of body, excluding rostrum and telson, 18 mm.

„ „ carapace, 6 mm.

South Australian coast.

One male; type in Adelaide Museum.

Legion, MONOCARPINEA.

Family, PONTONIIDÆ.

Borradaile, Ann. and Mag. Nat. Hist. Ser. 7, vol. ii., p. 376.

Genus *Pontonia*, Latreille.

Pontonia minuta, n. sp. Pl. xxiv., figs. 9-12.

The body is short, moderately robust, the pleon rather more bulky than the thorax in the female.

The carapace is about as long as the first four segments of the pleon, much broader than deep, with a triangular, subacute, infra-ocular tooth, and with the antero-lateral angles projecting a little beyond the base of the antennal scale, and also subacute. The postero-lateral lobe overlaps the first segment of the pleon. The rostrum is short, entire, depressed broad dorsally, rather obtuse at the apex, with a faint, broad median ridge, which scarcely extends on to the carapace, and is slightly pinched between the eyes, it has lateral sinuate ridges continuous with the orbits behind, and is rather deeply carinate below, even at the distal end, it reaches rather more than twice the length of the ophthalmopods.

The pleon is smooth and considerably narrowed behind in both directions, the terga of the second, third, and fourth segments are subequal in length, the first and fifth shorter, the sixth very short and narrow, with rather obtuse postero-lateral angles.

The telson is rather broad and regularly tapering, rounded distally, and scarcely fringed at the end, about two and a half times as long as the sixth segment of the pleon, with a broad, longitudinal sulcation, reaching quite to the end, it bears the usual quadrately placed spines, which are rather low down, and near the margin and scarcely project.

The ophthalmopods are short, without ocelli.

The antennular peduncle is a little longer than the rostrum, it is strong, the first joint is hollowed a little above, and has a very small stylocerite, the second joint is conspicuous, but the third is very small; the upper flagellum is about as long as the peduncle, and is folded back above, it is thick proximally, but soon tapers to a distal slender portion on the thickened portion, the sensory filaments are long and numerous, it is one-branched—or the splitting is very obscure: the lower flagellum is very short, and projects normally.

The antennal scale is rather ovate, it reaches as far as the antennular peduncle, the external distal spine is strong, terminating a thickened outer margin, it is subterminal in relation to the lamellar portion, the peduncle reaches as far as the scale; the flagellum is short and curves backwards.

The third maxillipeds are suboperculiform, of the three joints of the endopod the first is stout and compressed or expanded, especially at the base, the next two joints are small, and both together shorter than the first. The exopod is very small.

The first pair of legs are slender and chelate, the merus a little curved and subequal in length to the carpus, the carpus expands a little distally, the propodus is much shorter than the carpus and bent at an obtuse angle from it, it is a little compressed and expanded, and bears a brush of stiff setæ at the base of the immobile finger, the fingers are subequal in length to the palm, are slender, and do not gape.

The second legs are moderately robust, symmetrical, and equal, the ischium and merus combined are considerably shorter than the carpus and propodus combined, these together are a little compressed laterally and somewhat spindle-shaped in outline; the carpus is a little excavated on its outer surface, the propodus is more than twice as long as the carpus, the fingers are equal, rather narrow, curved, slightly setose, ending in acute points, and have a wide gape, they are about half the length of the palm.

The next two pairs are missing in this specimen. The last pair is more robust than the first, the propodus is strongly compressed, and its anterior margin is a little curved, its posterior margin nearly straight, it has a small distal spine with a longer one just above it, and a few hairs; the dactylus is strong, simple—or perhaps a little bifid at the tip—slightly curved, and is without a basal thickening.

In the first pleopods the inner ramus is small, the remaining pairs have the inner rami provided with long processes—*Stylamblys*.

The uropods are about as long as the telson, ovate, the subterminal spine of the outer one is very minute, and there is a very faintly-marked division.

There are five well-developed branchial plumes on each side.

The eggs are large and few.

Length, 11 mm.

Dredged by Dr. Verco: host unknown.

Type, one in Adelaide Museum.

DESCRIPTION OF PLATES.

Plate XXIII.

Fig. 1. *Cycloxanthus* (?) *carinatus*, n. sp., enlarged.
,, 2. *Ceratoplax punctata*, n. sp., nat. size.
,, 2*a*. ,, ,, pleon of female, enlarged.
,, 2*b*. ,, ,, cheliped, enlarged.
,, 3. *Pinnoteres holothuriensis*, n. sp., enlarged.
,, 3*a*. ,, ,, external maxilliped, enlarged.
,, 4. *Dromia octodentata*, Haswell, nat. size.

Plate XXIV.

Fig. 1. *Callianassa æquimana*, n. sp., nat. size.
,, 2. ,, ,, cheliped, enlarged.
,, 3. ,, ,, maxilliped, enlarged.
,, 4. ,, ,, 1st pereiopod, enlarged.
,, 5. ,, ,, 2nd ,, ,,
,, 6. ,, ,, portion of sternum, enlarged.
,, 7. ,, ,, 6th segment of pleon and tail-fan, enlarged.
,, 8. ,, ,, pleopod of 3rd segment of pleon, enlarged.
,, 9. *Pontonia minuta*, n. sp., enlarged.
,, 10. ,, ,, anterior portion, enlarged.
,, 11. ,, ,, end of 2nd maxilliped, enlarged.
,, 12. ,, ,, 3rd maxilliped, enlarged.

Plate XXV.

Fig. 1. *Cryptodromia depressa*, n. sp., nat. size.
,, 1*a*. ,, ,, pleon of male, enlarged.
,, 1*b*. ,, ,, cheliped, ,,
,, 2. *Processa australiensis*, n. sp., enlarged.
,, 2*a*. ,, ,, antennule, ,,
,, 2*b*. ,, ,, scale of antenna, enlarged.
,, 2*c*. ,, ,, 2nd maxilliped, ,,
,, 2*d*. ,, ,, 3rd ,, ,,
,, 2*e*. ,, ,, uropods and telson, ,,
,, 3. ,, *gracilis*, n. sp., enlarged.
,, 3*a*. ,, ,, 2nd pereiopod, right side, enlarged.
,, 3*b*. ,, ,, 2nd pereiopod, left side, ,,
,, 3*c*. ,, ,, tip of rostrum, ,,

Revision of the Australian Psychidæ.

By Edward Meyrick, B.A., F.Z.S., etc., and Oswald B. Lower, F.Z.S., F.E.S., etc.

[Read August 6, 1907.]

The members of this family are extraordinary insects, and comprise the most curious and remarkable of all Australian Lepidoptera; their larval habitations exemplify insect architecture in its most remarkable forms.

Some of the smaller *Tineina*, such as *Xysmatodoma* and *Talæporia*, exhibit similar larval peculiarities, but their cases (cocoons) never assume the proportions or ornamentation of the *Psychidæ*, although one species, *i.e.*, *Talæporia magnella*, Walk., deserves more than passing notice on account of its peculiar cylindrical case, which is built in the form of tiers.

The ♀ of the *Psychidæ* are usually thick, rather short, fleshy, grub-like creatures, devoid of wings, legs, or any properly developed antennæ. According to McCoy (Prod. Zool., Vic., iv. [1879), "the ♀ never leaves the case (cocoon), but after copulation brings forth an abundance of eggs, and the newly-hatched larvæ lower themselves by a fine strong silken thread, and immediately commence to each form a portable habitation for themselves, consisting of small pieces of leaves, bark, etc. These larval cases are open at the ends, and the larvæ protrude themselves just sufficiently out of the anterior portion of the case to use their legs for locomotion, generally fixing part of the edge of the aperture by fibres of silk, temporarily, to the twig it is on, so that when alarmed it withdraws completely within the larval case, which remains suspended and quite closed."

The cases are common and rather conspicuous objects in our scrubs, but the perfect insects are seldom met with, as the larvæ are subject to attacks of various species of parasitic *Diptera* and *Ichneumonidæ*.

The family is of cosmopolitan distribution, but more numerous in warm climates. The ♂ imago has thinly-scaled wings, without markings; flight strong and swift. The ♀ is almost wholly helpless; the abdomen is at first greatly distended with eggs, but ultimately shrivels up.

PSYCHIDÆ.

Head, densely rough-haired. Ocelli large. Tongue obsolete. Antennæ $\frac{1}{2}$, in ♂ strongly bipectinated to apex, sometimes apical portion simple. Labial palpi very short.

Thorax densely hairy above and beneath. Abdomen, femora, and tibiæ densely hairy, posterior tibiæ without middle spurs, end spurs very short. Forewings: 1a anastomosing with 1b before middle, 1c (when present) coincident with 1b beyond middle. Hindwings: 8 with one or more costal pseudoneuria (rarely without), 5 and 6 sometimes absent. ♀ apterous, without legs or developed antennæ.

Genera of Psychidæ.

In all the Australian genera the anterior tibiæ have a long strong spine rising from near base beneath in forewings. 1a coincides with 1b before middle.

TABULATION.

1.	Antennæ bipectinated to apex	2
	,, with apical portion simple	*Oiketicus*
2.	Basal joint of anterior tarsi much elongated ...	*Plutorectis*
	,, .. ., normal	3
3.	Terminal joint of anterior tarsi much elongated ...	*Clania*
	,, ,, ,, normal	4
4.	Forewings with vein 9 absent	*Elinostola*
	,, ,, ,, present	5
5.	Hindwings with vein 5 absent	*Hyalarcta*
	,, ,, ,, present	*Paracharactis*

1. ELINOSTOLA, n. g.

Antennæ bipectinated to apex (?) Abdomen moderate. Forewings with 1c coincident with 1b beyond middle, 4 and 5 stalked, 7 and 8 stalked, 9 absent. Hindwings with vein 5 absent, 6 absent, 8 without pseudoneuria.

Type.—*Hypomela.*

Recognized amongst other characters by the absence of vein 9 of forewings.

1. E. HYPOMELA, n. sp.

♂, 15 mm. Head, thorax, legs, and abdomen blackish (antennæ imperfect). Forewings rather elongate, moderately dilated posteriorly; costa somewhat rounded, termen oblique; very pale fuscous, semi-hyaline; cilia fuscous. Hindwings rather small, termen oblique, apex slightly prominent, dark fuscous, becoming paler on basal half; cilia as in forewings.

Case, unknown.

Brisbane, Queensland. One specimen; in September.

2. HYALARCTA, n. g.

Antennæ bipectinated to apex. Abdomen moderate. Forewings with 1c coincident with 1b beyond middle, 5 absent, 6 from above middle of transverse vein, 7 sometimes out of 8, 8 and 9 stalked, 10 and 11 sometimes stalked. Hindwings with vein 5 absent, 6 and 7 approximated or coincident, 8 coincident with cell beyond middle.

Type, *nigrescens*, Dbld.

Differs from the other Australian genera by the absence of vein 5 of forewings.

1. Antennæ blackish	 2	*nigrescens*
2. ,, dark orange	 3	*Huebneri*
3. Antennal pectinations 10	 4	*ptilodada*
4. ,, ,, 6	... ...	1

2. H. NIGRESCENS, Dbld.

Thyridopteryx nigrescens, Dbld., Eyre Exped. Aus. i., p. 437, t. 5, fig. i., 1845. *Oiketicus Herrichii*, Westw., P.Z.S., p. 232, t. 37, fig. 3, 1854; Macal. Proc. N.H. Soc., Dublin v., p. 132, fig. i., 1867.

♂, 26 mm. Head, thorax, and abdomen black; face and palpi white; thorax sometimes with a posterior dull ochreous spot. Antennæ dark fuscous, pectinations fuscous, at greatest length 6. Legs ochreous-reddish, hairs of tibiæ black. Forewings elongate-triangular, costa straight, apex rounded, termen rounded oblique; hyaline-iridescent, veins outlined with ochreous-reddish; a broad ochreous-reddish costal streak, from base of costa to end of cell, caused by thickening of veins; base of wing blackish, especially along dorsum; cilia ochreous-fuscous. Hindwings rather small, apex rounded, tolerably prominent, termen rounded, continuous with apex; colour, veins, and cilia as in forewings; dorsal third of wing thickly irrorated with minute scales, forming a patch throughout.

Case.—30-38 mm. in length, 30 mm. in circumference at greatest breadth; greyish-ochreous, minutely spotted with blackish; cylindrical, moderately smooth, not ornamented with leaves or twigs, tapering at both ends, lower end more elongate and narrow. Surface marked with seven longitudinal ridges, by their projections forming concavities between the ridges, which gives a transverse section the appearance of a heptagon with concave sides. The case is fixed by its upper end to the food-plant by a strong, short, thick appendage, which is sometimes looped around the twig to which it is attached.

The case is not unlike a large dried seed capsule in general appearance.

Larva.—The larvæ are fuscous, mixed with blackish, the head and anterior segments becoming pale fuscous, and the second thoracic segment is irrorated with fuscous. Feeds on *Eucalyptus*, sp.

This is not a common species.

Sydney, New South Wales; Adelaide, South Australia; and Gisborne, Victoria. Five specimens; in February and March.

3. H. HUEBNERI, Westw.

Oiketicus Huebnerii, Westw., P.Z.S., p. 228, t. 36, fig. i., 1854; Macal. Proc. N.H. Soc., Dublin, p. 133. *O. Careyi*, *ib.*, *l.c.*, p. 133.

♂, 28 mm. Head, face, thorax, and abdomen blackish-fuscous, antennæ dark-orange, pectinations dark-orange, at greatest length 6. Legs dark-fuscous. Forewings elongate-triangular, costa straight, apex rounded, termen obliquely rounded; hyaline-opalescent; veins outlined with pale ochreous, costa broadly pale yellow, from base to near $\frac{3}{4}$, caused by confluence of veins; cilia ochreous. Hindwings rather small, termen rounded; colour, veins, and cilia as in forewings; costa with a broad black line from base to middle, hairs of dorsum black, moderately thick.

Case.—40-45 mm. in length; diameter, 13 to 15 mm.; circumference, 30 mm.; extreme circumference, 54 mm.; ovate-lanceolate, broadly tapering at both ends; dull grey-whitish or greyish-fuscous, thickly ornamented except posterior $\frac{1}{6}$ with (A) innumerable, irregularly arranged fine long twigs of *Pinus insignis*, which hang down loosely and vary in length from 10 to 40 mm. (B.) ornamented with similar twigs and pieces of leaves or phyllodia of *Eucalyptus*. (C) ornamented throughout with moderately large pieces of leaves or phyllodia of *Eucalyptus* and *Leptospermum*, placed indiscriminately. The opening of the lower extremity of the cocoon is broadly ovate. The case is fixed to the food-plant by a thick piece of strong, silken material which is generally looped to the stem, but is sometimes without the loop. The cases are very different in their outward appearance on account of the different food-plants.

Larva.—The larvæ are similar to the previous species, but somewhat lighter-coloured, and marked with reddish on anal segments.

This species is easily separated from *nigrescens*, Dbld., by its orange antennæ.

Adelaide, South Australia; Melbourne, etc., Victoria; Sydney, etc., New South Wales; and Brisbane, Queensland. Several specimens; from December to April.

4. H. PTILOCLADA, n. sp.

♂, 28 mm. Head grey-whitish. Thorax and abdomen black, thorax anteriorly with a patch of whitish hairs. Abdomen rather elongate. Antennæ fuscous, pectinations fuscous, at greatest length 10 (imperfect). Legs blackish. Forewings very elongate, costa slightly arched, apex rounded, termen strongly oblique, gently rounded; hyaline, slightly iridescent; veins outlined with pale ochreous; a broad pale ochreous costal streak caused by confluence of veins, from base to $\frac{3}{4}$: basal fourth of wing thickly irrorated with fuscous scales; cilia fuscous. Hindwings rather small; colour, cilia, and veins as in forewings, basal portion of wing as in forewing, but the colour is continued further along dorsum.

Case and *Larva*.—Unknown.

Differs from the other species by the more elongate forewings and longer pectinations of antennæ.

Nar-nar-goon, Victoria. Type in *Coll., Lyell.*

3. Clania, Walk.

Antennæ bipectinated to apex. Terminal joint of anterior tarsi elongate. Abdomen moderate. Forewings with several dorsal pseudoneuria, 1c coincides with 1b beyond middle, 4 and 5 stalked, 7 connate with 8, 8 and 9 stalked. Hindwings with 4 and 5 stalked, 8 connected or anastomosing with 7, with several costal pseudoneuria. Recognized by the anastomosis of veins 8 and 7 of hindwings. The cases of the species vary little in appearance.

1.	Face white,. antennæ ochreous-fuscous	5	*Dewitzi*
2.	,, ,, dark fuscous ...	6	*ignobilis*
3.	Thorax with longitudinal white stripes	7	*tenuis*
4.	,, without ,, ,,	6	
5.	Forewings light fuscous, semi-transparent	8	*Lewinii*
6.	,, blackish fuscous, opaque ...	5	
7.	,, hyaline, devoid of markings ...	9	*hemitricha*
8.	,, ,, with black scales on margins	10	*photidias*

5. C. Dewitzi, Heyl.

Oiketicus Dewitzi, Heyl., Ann. Soc. Ent. Belg., xxix., p. cxix., 1886.

♂, 32 mm. Head, thorax, and abdomen fuscous, face whitish, thorax mixed with rufous and dull whitish. Antennæ ochreous-fuscous, pectinations reddish-ochreous, at greatest length 6. Legs fuscous, anterior pair mixed with reddish-ochreous, and with a whitish tuft of hair on anterior portion of tibiæ. Forewings elongate, moderately broad, costa gently arched beyond middle, termen unevenly rounded, oblique; dark fuscous, inclining to black on basal third; veins outlined with fuscous; semi-transparent; cilia dark fuscous. Hindwings with apex rounded, termen rounded continuous with apex; colour and cilia as in forewings, hairs of dorsum dark fuscous.

Differs from the other species by its blackish colouring and ochreous antennæ.

Case and *Larva*.—Unknown.

Launceston, Tasmania. One specimen; in October. The type came from Sydney, New South Wales.

6. C. IGNOBILIS, Walk.

Entometa ignobilis, Walk., Char. Lep. Het., p. 67, n. 7, 1869; McCoy, Proc. Zool. Vict., iv., t. 40, ff. 7-10, 1879.

♂, 36-40 mm. Head and thorax ochreous-reddish, face white or whitish, thorax anteriorly paler. Antennæ and abdomen dull ochreous-reddish, somewhat fuscous tinged, a dull whitish tuft of hair at base of antennæ. Antennal pectinations at greatest length, 8. Legs pale ochreous-fuscous. Forewings elongate, costa almost straight, arched towards apex, apex hardly rounded, termen oblique; fuscous, becoming darker around edges and towards base, cell semi-transparent; veins outlined with ochreous fuscous; cilia fuscous. Hindwings with apex somewhat prominent, termen oblique. Slightly sinuate, on posterior half; colour, outlining of veins, and cilia as in forewings.

Case.—35-50 mm. in length; diameter, 10-15 mm.; circumference, 30-45 mm. Cylindrical, tapering broadly at both ends; dull fuscous, thickly ornamented with a solid fence of stout pieces of stems of food-plant, placed longitudinally and placed thickly together. These pieces of stems vary in length from 20 to 90 mm. Of the latter lengths there are but 2 or 3 to each case, and are usually much thicker than the others, appearing to act as supports.

Larvæ.—The larva is a somewhat fusiform, short, almost naked, fuscous-coloured creature. Head and thorax creamy white, thickly strigulated with dark fuscous, posterior segments with a few scattered hairs.

This is the commonest and most widely distributed species of the group. The larvæ feed on various species of *Eucalyptus*. (We have bred the ♂ from *E. rostrata* in South Australia.) But the perfect insects are rarely taken on the wing, being unmercifully attacked by various species of parasitic *Diptera* and *Ichneumonidæ*, in the larval stage. It has stood for many years in collections as *Entometa ignobilis*, but the genus *Entometa* is one of the *Lasiocampidæ*, of which *obliqua*, Walk., is the type, according to Kirby.

The type of *ignobilis* is in the National Museum, Melbourne.

Sydney, New South Wales; Melbourne, Gisborne, etc., Victoria; Perth, Western Australia; and Adelaide, etc., South Australia. Several specimens; in January and February.

7. C. TENUIS, Rosen.

Ann. Nat. Hist., 5, xvi., p. 422, t. 11, fig. 3, 1885.

♂, 22 mm. Head, thorax, antennæ, abdomen, and legs black, face snow-white, patagia white, thorax with two raised woolly-white longitudinal stripes of hair almost meeting at posterior portion, and more or less continued to anterior portion of abdomen, antennal pectinations at greatest length 6. Forewings elongate, moderate, costa nearly straight, apex rounded, termen gently bowed, oblique; light fuscous, minutely irrorated with blackish, more especially around margins; cell with an almost transparent elongate cordate patch at posterior extremity; veins outlined with blackish; cilia short, blackish. Hindwings with apex rounded, termen rounded, continuous with apex; colour, veins, and cilia as in forewings; hairs of dorsum blackish.

Case.—25-28 mm. in length; dull greyish-fuscous, main projecting twin 35 mm. long, case 7 mm. in diameter, 27 mm. in circumference, ornamented by about four main pieces of twigs of *Eucalyptus*, sp., which are the full length of cocoon, and about 12 to 16 smaller, shorter, and somewhat similar pieces, some of which are equally as long as the four, but thinner; the main projecting stem is generally much thicker than the rest, and extends about 10 mm. beyond the extremity of the lower aperture of case. Outer portion of twigs more or less covered with innumerable silky grey-whitish hairs, rather short.

Launceston, Tasmania. A fine series bred by Mr. F. M. Littler; in January. Also from Sydney, New South Wales; Blackwood and Port Lincoln, South Australia; Gisborne and Stawell, Victoria.

8. C. Lewinii, Westw.

Oiketicus Lewinii, Westw., P.Z.S., Lond., 1854, p. 231, t. 37, fig. 1; Macal., Proc. Nat. Hist. Soc., Dublin, v., p. 131, 1867.

♂, 24 mm. Head, thorax, antennæ, abdomen, and legs brownish, face whitish, patagia whitish, thorax with two dull white longitudinal stripes of woolly hair more or less meeting posteriorly. Antennal pectinations light fuscous, pectinations at greatest length 6. Forewings elongate, moderate, costa nearly straight, apex rounded, termen gently bowed, oblique; very light fuscous, minutely irrorated with darker fuscous, especially around margins; cell with an almost transparent elongate-cordate mark at posterior extremity; veins outlined in dull fuscous; cilia fuscous, rather short. Hindwings with apex rounded, termen rounded continuous with apex; colour, veins, and cilia as in forewings, hairs of dorsum light fuscous.

Case.—Unknown.

This species appears to differ from the preceding, to which it is closely allied, by its larger size and more brownish colouring; *tenuis* approaches it very closely in general appearance, but the colouring in the 16 specimens before me of that species is black or blackish, whereas in the present it is brown or pale brown.

Gippsland, Victoria; Sydney (Katoomba), New South Wales; Blackwood, South Australia. Five specimens; December to February.

9. C. HEMITRICHA, n. sp.

♂, 25 mm. Head and thorax fuscous, face whitish, thorax with whitish longitudinal lateral stripes. Antennæ fuscous, pectinations at greatest length 8. Abdomen fuscous. Legs fuscous, anterior coxæ very hairy. Forewings elongate, moderate; costa hardly arched, termen gently bowed oblique; hyaline, semi-transparent; faintly iridescent; basal half of wing irregularly and minutely irrorated with light fuscous; costal area narrowly fuscous; veins outlined with light fuscous; cilia fuscous, short. Hindwings with termen rounded, faintly sinuate in middle; an irregular patch of fuscous scales towards base, dorsal hairs fuscous; veins and cilia as in forewings.

Case.—Unknown.

Differs from the other described species by the longer antennal pectinations and clearer wings.

Townsville, Queensland. One specimen bred in October *(Dodd)*. I also possess two damaged specimens from Cooktown. Sent by Mr. Olive.

10. C. PHOTIDIAS, n. sp.

♂, 40 mm. Head, thorax, and abdomen ochreous-fuscous, face mixed with whitish. Antennæ fuscous, pectinations dark-fuscous, at greatest length 12. Legs ochreous-fuscous. Forewings elongate, moderately dilated. Costa nearly straight, apex rounded, termen oblique; semi-transparent, somewhat irridescent, with some minute sparse scales around margins, thickest near base of costa; veins outlined with light fuscous; cilia fuscous (imperfect). Hindwings with apex rounded, continuous with termen; colour, veins, and cilia as in forewings; hairs of dorsum ochreous, mixed with fuscous.

Case.—Unknown.

At once recognized by the clear wings and long pectinations of antennæ.

Cairns, Queensland. One specimen taken by the late G. Barnard at Barron Falls.

4. OIKETICUS, Guild.

Antennæ bipectinated, towards apex simple. Basal joint of anterior tarsi very elongate. Abdomen extremely elongate. Forewings sometimes with several dorsal pseudoneuria, 1c coincides with 1b beyond middle, 4 and 5 stalked, 7 and 8 out of 9. Hindwings with 4 and 5 stalked, with a coastal pseudoneurium before middle.

Thorax, orange ... ... 11. *elongatus*
,, fuscous ... ... 12. *tertius*

11. O. ELONGATUS, Saund.

Trans. Ent. Soc. Lond. v., p. 43 (1847). *Metura elongata*, McCoy, Prod. Zool. Vict. iv., p. 43, t. 40, ff. 1-6 (1879). *O. Saundersii*, Westw., P.Z.S., Lond., p. 223, t. 35 (1854).

♂, 42-48 mm. Head and thorax orange-yellow, thorax posteriorly blackish. Antennæ black, pectinations black, at greatest length 8, very short on anterior half. Abdomen very elongate, orange, with broad, black posterior segmental bands, two anterior segments wholly black. Legs blackish, anterior tibiæ dull orange, banded with blackish above. Forewings very elongate, rather narrow, slightly dilated posteriorly, costa slightly arched beyond middle, apex strongly rounded, termen rounded, continuous with apex, slightly sinuate before anal angle; dark fuscous, becoming blackish along basal and costal areas; veins outlined with dull ochreous-white, semi-transparent on some portions; cilia fuscous. Hindwings with costa strongly arched, apex prominent, termen rather strongly sinuate at anal angle; colour, markings, and cilia as in forewings; dorsal hairs rather long, blackish.

Case.—80-120 mm. in length, extreme diameter 40-60 mm. Cylindrical tapering at both ends; greyish-white mixed with fuscous, lower portion more or less covered with small pieces of broken phyllodia, etc., and indiscriminately ornamented on upper half with stout twigs of *Eucalyptus*, varying from 20 to 30 mm. in length in irregularly-arranged series; those on lower half are generally much longer, and vary from 30 to 70 mm., usually from 3 to 6 of latter length. Case usually fixed to food-plant by a piece of strong silken appendage from 10 to 15 mm. long, and about 5 mm. in diameter. Easily recognized by the rather narrow, elongate forewings and orange and black abdomen.

Melbourne, etc., Victoria; Sydney, etc., New South Wales. Four specimens in December. We have not yet met with specimens from South Australia, although the species is said to be taken there.

12. O. TERTIUS, Temp.

T.E.S., Lond., v., p. 39, t. 5, ff. 1-5 (1847); *O. Templetonii*, Westw., P.Z.S., Lond., p. 234, t. 36, fig. 2 (1854). *Eumeta T.* Walk. Cat. Lep. Het. iv., p. 965 (1855). *Dappula T.*, Moore, Lep. Ceylon ii., p. 103 (1883). *Oiketicus ulias*, Low, Proc. Linn. Soc., N.S.W., p. 83 (1899).

♂, 40 mm. Head, thorax, antennæ, and abdomen dark fuscous, face ochreous-fuscous, antennal pectinations at greatest length 8. Legs, dark fuscous; tarsi, with dull whitish rings. Forewings rather elongate. Costa slightly arched on apical half, termen very oblique, slightly bowed; dark fuscous; an elongate, somewhat ovate, very dark fuscous spot, occupying posterior half of cell, edged posteriorly, and sometimes laterally, with a narrow strip of dull whitish, which tends to be continued along veins posteriorly; lower portion of base of wing somewhat darker than rest of ground colour; cilia very short; fuscous. Hindwings, with apex prominent, hardly acute, termen sinuate in middle; dark fuscous; cell more or less outlined with dull whitish; dorsal hairs dull ochreous-fuscous; cilia as in forewings.

Case and *Larva.*—Unknown.

At once recognized by its uniform colouring and elongate-ovate spot in cell.

Cooktown, Queensland. Several specimens received from Messrs. E. A. Olive and F. P. Dodd in August and November; also from India and Ceylon.

5. Plutorectis, n. g.

Antennæ bipectinated to apex. Basal joint of anterior tarsi much elongated. Abdomen moderately elongate. Forewings with one or more dorsal pseudoneuria; 1c coincides with 1b beyond middle; 4 and 5 connate or stalked, 7 sometimes out of 8, 8 and 9 stalked. Hindwings, with 4 and 5 sometimes stalked or coincident; 6 and 7 remote, 8 with one or more costal pseudoneuria, sometimes twice connected with 7.

Type.—Boisduvalii, Westw.

This is the predominant genus in Australia, to which additions may be expected. The species have a general resemblance to the following genus, but are separable by the position of veins 4 and 5 of hindwings.

1.	Thorax orange, antennæ orange	...13	*melanodes*
2.	,, ,, ,, black ...	...14	*xanthochrysa*
3.	Basal half of forewings black ...	...16	*zophopepla*
4.	,, ,, ,, not black	...18	
5.	Forewings fuscous, thorax orange-fuscous	15	*Boisduvalii*
6.	,, ,, ,, fuscous	...19	*gymnophasa*
7.	Forewings pale ochreous-grey ...	...20	*lurida*
8.	,, nearly black	...13	
9.	Forewings hyaline, base black ...	...17	*hyaloscopa*
10.	,, uniform grey-whitish	...18	*grisea*

13. P. melanodes, n. sp.

♂, 32 mm. Head, thorax, antennæ, and abdomen bright orange-ochreous, both above and beneath, antennal pectinations at greatest length 6. Legs orange-ochreous, tarsi slightly infuscated. Forewings, elongate moderate; costa nearly straight, arched towards apex, termen oblique, not rounded; dull transparent-whitish, minutely irrorated with black, which coalesces on basal half of wing so as to appear black; veins outlined with dull fuscous; cilia ochreous. Hindwings with costa rather strongly arched, apex somewhat prominent, termen gently rounded; dull fuscous, semi-transparent; dorsal hairs blackish; at base yellowish; cilia as in forewings.

Case and *Larva*.—Unknown.

Mackay (R. E. Turner), Cape York (C. French), Queensland. Two specimens.

14. P. XANTHOCHRYSA, n. sp.

♂, 32 mm. Head, thorax, abdomen, and legs bright orange-ochreous, hairs of orbital rims black, antennæ black, pectinations at greatest length 6. Forewings elongate, moderate; costa nearly straight, slightly sinuate before middle, termen gently and obliquely rounded; pale fuscous, semi-transparent; cilia fuscous. Hindwings, with apex rounded, termen rounded, continuous with apex; colour as in forewings; cilia as in forewings.

Case and *Larva*.—Unknown.

Recognized by the black antennæ.

Perth, Western Australia. One specimen received from Mr. S. Angel; taken in November.

15. P. BOISDUVALII, Westw.

Oiketicus Boisduvalii, Westw., P.Z.S. Lond., p. 232, t. 37, fig. 2 (1854); (?) *Lomeria B.*, Walk., Cat. Lep. Het., iv., 967 (1855).

♂, 28 mm. Head, thorax, and abdomen dark ochreous, tinged with fuscous, face fuscous, thorax beneath and hairs of orbital rings blackish. Legs ochreous-fuscous. Antennæ fuscous, pectinations ochreous-fuscous, at greatest length 6. Forewings elongate, moderate; costa very slightly arched, not sinuate, termen oblique, faintly rounded; light fuscous, semi-transparent; cilia light fuscous. Hindwings with apex rounded, termen rounded continuous with apex; colour and cilia as in forewings.

Case and *Larva*.—According to Mr. W. W. Froggatt (Misc. Pub. Dep. Agric., No. 337) the case of this species is "a slender elongate-oval case, about 2 inches in length, thickly covered with short bits of stick, closely attached to the silk, so that it is quite stiff. The larvæ feed on several species of low shrubs around Sydney."

The perfect insects appear to be scarce. This species is allied to the preceding, but differs by the blackish face and blackish thorax beneath, besides being smaller and narrower-winged.

Blackwood, South Australia. One specimen.

16. P. ZOPHOPEPLA, n. sp.

♂, 30 mm. Head, thorax, and antennæ orange-ochreous, posterior half of thorax infuscated. Antennal pectinations at greatest length 8; orange-ochreous, very short on terminal half. Legs ochreous-fuscous. Abdomen ochreous. Forewings elongate, moderate. Costa slightly arched, not sinuate, termen oblique, hardly rounded; dull whitish, semi-transparent on posterior half of wing, basal $\frac{2}{3}$ of wing minutely irrorated with dark fuscous, which coalesce on basal half so as to appear black; cilia dull ochreous. Hindwings with apex rounded, termen rounded continuous with apex; colour and cilia as in forewings.

Case.—Cylindrical, 25 to 35 mm. long; diameter, 10 mm. Dull white, white in some species; wholly or nearly wholly thickly ornamented with leaves of *Euclayptus*, and with one or two thin, long twigs protruding from 1 to 2 inches beyond posterior extremity of sac. This is the general form, but some are more meagrely ornamented with pieces of grass-stems, varying from 10 to 40 mm. in length, whilst others are ornamented with both leaves and stems, scarcely two (out of 20) being alike. Very similar in appearance to *Melanodes*, but appears to differ by the narrower and longer forewings, and different-shaped hindwings.

Mackay (R. E. Turner) and Townsville (Dodd), Queensland. Several specimens; received in December.

17. P. HYALOSCOPA, n.sp.

♂, 30 mm. Head, thorax, antennæ, abdomen, and legs blackish, thorax lighter in middle, antennal pectinations at greatest length 8, black (imperfect). Anal tuft ochreous. Forewings elongate moderate, costa nearly straight, termen unevenly rounded, oblique; hyaline, semi-transparent, basal third and costal edge sprinkled with fine linear blackish scales; cilia fuscous. Hindwings with apex feebly prominent, termen unevenly rounded; colour, markings, and cilia as in forewings, but costal edge with markings broader and better defined; dorsal hairs black.

Case and *Larva.*—Unknown.

Very distinct by the almost clear wings. North-west Victoria. One specimen; beaten from *Casuarina*, sp.; in November.

18. P. GRISEA, Heyl. (*Chalia grisea*, Heyl.).

Ann. Soc. Ent. Belg., xxix., p. cxx. (1886).

♂, 20 mm. Head, thorax, antennæ, legs, and abdomen pale dull ochreous, face darker, a tuft of whitish hair at base of antennæ beneath, antennal pectinations at greatest length 8, much shorter on apical third. Forewings elongate, moderate, costa nearly straight, apex rounded, termen gently bowed, oblique; dull grey-whitish, semi-transparent, along costal edge somewhat ochreous, extreme costal edge fuscous; cilia greyish. Hindwings with termen evenly rounded; colour and cilia as in forewings; dorsal hairs ochreous.

Case and *Larva*.—Unknown.

An obscure species; the specimen not being in the best of condition, the description may require a slight amendment.

Broken Hill, New South Wales. One specimen; at light; in March.

19. P. GYMNOPHASA, Low.

O. gymnophasa, P.L.S. N.S.W., p. 39, 1900.

♂, 20 mm. Head, palpi, antennæ, thorax, legs, and abdomen fuscous, face darker fuscous, thorax darker anteriorly. Antennal pectinations fuscous, at greatest length 8. Forewings elongate, moderate, costa nearly straight, apex rounded, termen gently bowed, oblique; fuscous, slightly darker around margins; cilia fuscous. Hindwings with termen rounded; colour and cilia as in forewings.

Case and *Larva*.—Unknown.

Allied to the preceding; in fact, the two were formerly described under the one name, but more material having come to hand, the differences are apparent. Apart from the colour the antennæ in the present species is almost even throughout; in *grisea*, however, it is much shorter on apical third.

Broken Hill, New South Wales. One specimen; in October. Also from Melbourne and Ararat, Victoria (Hill).

20. P. LURIDA, Heyl.

Chalia lurida, Heyl., Ann. Soc. Ent. Belg., xxix., p. cxx., 1886.

♂, 20 mm. Head, thorax, and abdomen ochreous-grey, face fuscous, base of antennæ pale ochreous-grey, thorax beneath fuscous. Antennæ fuscous, pectinations pale fuscous, at greatest length 8, much shorter on apical $\frac{1}{6}$. Legs pale ochreous-grey. Forewings elongate, moderate, costa nearly straight, apex rounded, termen gently rounded, oblique; pale ochreous-grey, thickly clothed with greyish hairs, except on posterior third, and around termen, which is more thinly scaled and semi-transparent; cilia greyish, becoming fuscous on basal half. Hindwings with apex round, termen rounded continuous with apex; colour and cilia as in forewings, but wings more thinly scaled; dorsal hairs pale greyish-ochreous.

Case and *Larva*.—Unknown.

Differs from the other species especially by the density of scales and woolly appearance.

Duaringa, Queensland. One specimen. The type came from Cape York, Queensland.

6. PARACHARACTIS, n. g.

Antennæ bipectinated to apex, abdomen moderate. Forewings with one or two dorsal pseudoneuria, 1c very slight, free, 4 and 5 connate or short-stalked, 8 and 9 stalked, 10 sometimes out of 8. Hindwings with 4 and 5 connate, 6 and 7 remote, 8 with a costal pseudoneuria.

Type.—*Cautopsis*, Low.

The species of this genus bear a superficial resemblance to the preceding genus. Structurally, however, they differ in having vein 1c (though slight) free.

1.	Thorax greyish-fuscous, antennæ black	21	*Leeuwinii*
	,, not ,, ,, ,, ,,	22	
2.	Head and face orange	24	*delocephala*
	,, orange, face blackish	21	
3.	Forewings blackish-fuscous	22	*cautopsis*
	,, ochreous-fuscous	23	*erionota*

21. P. LEEUWINII, Heyl.

Eumeta Leeuwinii, Heyl., Ann. Soc. Ent. Belg., xxix., p. cxlviii., 1886.

♂, 30 mm. Head, thorax, abdomen, and legs grey, face fuscous fillet orange, anterior tibiæ and tarsi blackish, antennæ fuscous, pectinations at greatest length 6. Forewings elongate, moderate, costa nearly straight, termen gently rounded, oblique; greyish-fuscous, darker along margins; cilia grey. Hindwings with apex rounded, termen rounded; colour and cilia as in forewings; dorsal hairs dull ochreous.

Case and *Larva*.—Unknown.

Broken Hill, New South Wales. One specimen.

22. P. CAUTOPSIS, n. sp.

♂, 28 mm. Head, thorax, and abdomen dull rufous-orange, abdomen more fuscous tinged, face blackish. Antennæ blackish, strongly bipectinated to apex, pectinations at greatest length 6. Legs ochreous, mixed with fuscous. Forewings rather short, costa nearly straight, apex slightly rounded, termen somewhat oblique, very little rounded; uniform blackish-fuscous, darker along termen; cilia blackish. Hindwings with apex rounded, termen rounded, continuous with apex; colour and cilia as in forewings; dorsal hairs blackish.

Case and *Larva*.—Unknown.

Differs from any other of the described Australian species by its sooty-black colouring.

Newcastle, New South Wales. One specimen; in November.

23. P. ERIONOTA, Low.

Oiketicus erionota, Low., T.R.S. S.A., p. 63, 1901.

♂, 30 mm. Head, palpi, and thorax yellow-ochreous, face ochreous, antennæ fuscous, pectinations black, at greatest length 6. Legs and abdomen light fuscous ochreous-tinged. Forewings elongate, moderate, costa nearly straight, slightly sinuate before middle, apex rounded, termen gently bowed oblique; ochreous-fuscous, pale ochreous grey in some specimens; cilia greyish-fuscous. Hindwings with apex slightly prominent, termen rounded, continuous with apex; colour and cilia as in forewings.

Case and *Larva*.—Unknown.

In the former description of this species the characters were drawn from an abraded specimen. Having recently captured two more we are enabled to re-describe the species more accurately.

Broken Hill, New South Wales. Three specimens; in March and May.

24. P. DELOCEPHALA, n. sp.

♂, 32 mm. Head and face orange-yellow. Thorax, abdomen, and legs brownish-ochreous, fuscous-tinged, thorax lighter anteriorly, fillet orange. Antennæ ochreous-fuscous, strongly bipectinated to apex, pectinations black, at greatest length 6. Forewings elongate, moderate, costa nearly straight, apex rounded, termen bowed, oblique; smoky-brown, darker around margins; cilia rather long, smoky-fuscous. Hindwings with apex rounded, termen rounded, continuous with apex; colour and cilia as in forewings.

Case and *Larva*.—Unknown.

Very distinct by the orange head and face.

Sydney, New South Wales. One specimen.

The following species are wrongly referred to the *Psychidæ*, or unknown to us, viz.:—

Psyche albifrons, Wallenger.
Eumeta Ernesti, Heyl. (prob. = præc.).
Genduara cinerea, Walk.
Panisa circumdata, Walk.
Psychanisa circumdata, Walk.
Entometa ignobilis, Walk. See No. 6.
Cebysa conflictella, Walk., belongs to the *Tineidæ*.

Oiketicus bicolor. Luc., P.L.S, N.S.W., p. 137, 1893. (*Oeceticus bicolor*, Luc.)

"♂, 26 mm. Head, thorax, and abdomen ferruginous-ochreous. Antennæ black, midrib white, pectinations narrowing at base and apex. Forewings with costa gently rounded, hindmargin rounded; light ochreous-drab or mouse colour, thinly scaled, veins darker; cilia darker or a more fuscous drab. Hindwings as forewings.

"Victoria. An unpretentious-looking insect, the centre ferruginous-ochreous, being the more conspicuous because of the sombre-looking wings." Unknown to us.

Oiketicus felinus, Luc. (*Oeceticus felinus*, Luc.), Proc. Roy. Soc. Queensland, p. 140, 1899.

"♂, 28 mm. Head fuscous, face wool-white. Palpi and antennæ fuscous. Thorax creamy-grey, with anterior band, dorsal and lateral bands rich velvety-fuscous, inclining to black. Abdomen ferrous-red, freely covered with rich, velvety black hairs, caudal segment ferrous-red. Forewings elongate, gently dilate, costa gently rounded, hindmargin obliquely rounded; hyaline, with veins rich velvety fuscous; cilia blackish fuscous. Hindwings and cilia as in forewings. ♀, apterous. Builds its domicile in *Casuarina* needles. A ♀ (bred) was visited by two males, and so taken. May Orchard, Brisbane." Unknown to us.

Oiketicus Macalisteri, Macal., Proc. N. Hist. Soc. Dublin, p. 134 (1867). This is *Talaeporia magnella*, Walk. (Tineidæ).

Eurycyttara (Hamps.), *Macleayii*, Guild; *Oiketicus Macleayii*. Guild, T.E.S., Lond. xv., p. 375, t. 8 (1827); Westw., P.Z.S., p. 222, t. 34, fig. 3 (1854).

The type is unique, and is in the British Museum. We were unable to make a proper examination of the type, but the following are notes on it:—

Expanse, about 17 mm. Wings shaped much as in *Clania tenuis*, Rosen. Head, antennæ, etc., and all wings wholly dark fuscous; thorax slender. Westwood gives the neuration as follows:—In forewings only 10 terminal branches, the third branch of the sub-costal and the upper discoidal being obsolete, and the lower discoidal rises conjointly with third branch of median from lower angle of cell, *i.e.*, as we understand 4 and 5 stalked, 6 absent, 9 absent.

Described from type in British Museum.

We would like to take this opportunity of expressing our thanks to Messrs. J. Kershaw (Melbourne Museum), J. G. O. Tepper (Adelaide Museum), W. W. Froggatt (Technological Museum, Sydney), G. Lyell, F. P. Dodd, and Miss May Wise for their generous assistance by the loan and gift of specimens.

Three New Species of Orchid.

By R. S. Rogers, M.A., M.D.

[Read October 1, 1907.]

Plate XXVI.

Diuris palachila, *sp. nov.*

This species has long been familiar to members of the Field Naturalists' Section of the Royal Society, under the name of *Diuris intermedia*, but has never been described, owing to the opinion which seemed to prevail in the Section that it was a hybrid. It is, however, a distinct and well-marked form, appearing regularly in considerable numbers in certain localities. The earliest date on which I have collected it is September 10, at Blackwood. I have also recorded it from Port Victor, Belair, Black Hill, Gandy's Gully, Barossa, and other parts of the State. The name *intermedia* was applied to it, because it was supposed to occupy an intermediate position between *D. maculata* and *D. pedunculata*. Its nearest ally is, however, *D. setacea*, a western species, and I have, therefore, thought it inadvisable to perpetuate a name founded on a misapprehension. I have called it *D. palachila*, owing to the spade-shaped form of the central lobe of the labellum.

Plant varies from 4 to 15 inches high.

Leaves narrow-linear to linear, often 7 inches long. A *bract* subtends the pedicel of each flower, and two or more long, closely-sheathing bracts are to be found on the stem.

Flowers.—1-3 on fairly long pedicels. Lateral sepals green, linear-acuminate, about same length as lateral petals, with a tendency to cross as in *D. maculata*. Dorsal sepal more or less ovate, closely embracing the column below, about same length as labellum; yellow, generally with reddish-brown or purplish blotchings or dots showing chiefly on the outer surface, near the base and around the margins. Lateral petals elliptical, markedly stalked, yellow, or with markings of similar colour and disposition as in the case of dorsal sepal.

Labellum.—3-partite, the clefts between the lobes not reaching to within less than a line of the base. Lateral lobes rather more than half as long as central lobe, triangular, and usually dentate on outer margin. Central lobe spade- or shovel-shaped; entire margin; two widely-separated, raised, longitudinal lines on its stalk, fusing on the lamina into a single well-marked raised line, which extends to the apex.

Labellum, with dark-purplish or reddish-brown blotchings, especially on its under-surface.

Lateral appendages of column subulate, reaching rather higher than the anther tip. Stigmatic surface extensive and somewhat heart-shaped, with rostellum placed high up in front of and below the anther.

The leaves of this species are relatively longer and wider than in *D. setacea;* the lateral lobes of the labellum are not so wide, and the clefting does not extend nearly so deeply; the middle lobe is not so markedly stalked; the two raised lines are much more widely separated; and the lateral appendages of the column are relatively longer. In other respects, the two species closely approach each other.

Caladenia gladiolata, *sp. nov.* Pl. xxvi.

A somewhat stunted hirsute species, varying from 3-7 inches high, found at Hornsdale, near Appila-Yarrowie, September 10, 1907, in poor soil.

Leaf.—Hairy, varying in shape and size from ovate-lanceolate to oblong-lanceolate.

Bracts.—Two, one subtending the flower.

Flower.—Usually solitary, rarely two; greenish-yellow with red markings; varies in diameter according to size of plant.

Petals.—Linear-lanceolate, rather shorter than sepals; yellowish-green, with red stripe down centre.

Sepals of about equal length and appearance; lateral ones flattened throughout, constricted about one-third from distal end, the distal third being fluted, reddish-brown in colour, glandular- and bayonet-shaped (from which character the species has been named); reddish vein running down centre of dilated proximal two-thirds. Dorsal sepal incurved, with rather clavate point.

Labellum on a movable hinge, ovate, recurved at tip. Lateral lobes semicircular, usually entire or slightly dentate anteriorly; yellowish-green. Middle lobe, reddish-brown, crenulate. No sign of veining on labellum. Calli large piriform, dark reddish-brown, in 4 crowded somewhat irregular rows, occupying posterior two-thirds of middle lobe.

Column widely winged in its upper part, wings tapering off towards the base, much incurved. Anther shortly pointed, horizontal. Two oval glands at base of column. Stigmatic surface just below the anther.

This *Caladenia* is a near ally of *C. clavigera* and *C. tesselata*, Fitz., both eastern species. From the former it differs in the absence of clavate points to lateral sepals, in the shape and appearance of the calli, in the wide winging of the column, and in the oval glands at base of column (they are globular in *clavigera*). From the latter it may be distinguished by the facts: that the calli do not appear on the tip of the labellum, that the labellum is recurved, and that the leaf is not narrow.

DESCRIPTION OF PLATE XXVI.

CALADENIA GLADIOLATA, *sp. nov.*

A. Plant about natural size, showing bayonet-pointed lateral sepals. (Lateral aspect.)
B. Shows dorsal sepal and hinged labellum with recurved tip.
C. Flower, from the front, showing the four rows of crowded calli on lamina.

[Read September 9, 1907.]

Caladenia tutelata, *sp. nov.*

On October 2, 1906, I read a paper before this Society describing a new *Caladenia*, found at Blackwood, by Mr. A. Keith Ashby. Only two specimens were available for examination, and, consequently, it was uncertain whether this interesting form should be regarded as a hybrid between *Caladenia deformis* and *Glossodia major*, or whether it was really a new species. Fresh discoveries on August 24 of this year have removed this uncertainty, and I am now able to record an entirely new species, which I have called *Caladenia tutelata*, on account of the tall sentinel calli which appear to guard the entrance to the column. These calli were described in my former paper as being about $\frac{1}{8}$ inch in height, clavate at their free extremities, and standing erect in a row at the base of the column.

In this supplementary note I would like to add that an examination of further specimens shows a strong tendency for these calli to cohere or fuse together. In two specimens they were fused into two broadly-filamented, double-headed calli. In another specimen all the filaments were coherent, forming a vertical plate in front of the column. Such fusions are extremely interesting from a developmental standpoint, as they appear to me to throw light upon the origin of the appendages in the genus *Glossodia*, which have probably arisen in an identical manner. In four out of five species of *Glossodia*, the appendages are two in number, with clavate points; and in the case of one of these, *G. intermedia*, Fitz., these clavate points are slightly bifid, indicating their probable origin from four calli. In the fifth, *G. major*, the top of the single appendage is bifid, but the width of the plate is suggestive of more than two filaments having entered into its composition.

C. tutelata is distinctly a transitional form between the *Caladenias* and the *Glossodias*, and emphasizes the point raised in my former paper, as to the wisdom of separating these two genera in a natural classification.

In colour, this species more nearly approaches *G. major* than *C. deformis.* The two rows of golfstick calli are generally well defined as far as the middle of the labellum, where they merge into still smaller calli of less regular distribution. The margin of the labellum is unfringed.

There were no *Glossodias* yet in bloom in the gully where these specimens were discovered, and one had to search diligently for an odd specimen in other parts of the ranges. The early date of blooming, therefore, of the new species, would alone put the question of hybridization practically out of court.

Notes on South Australian Marine Mollusca, with Descriptions of New Species.—Part VI.

By Jos. C. Verco, M.D. (Lond.), F.R.C.S. (Eng.).

[Read August 6, 1907.]

Plates XXVII. and XXVIII.

Sepia braggi, *sp. nov.* Pl. xxvii., figs. 6, *6a*, *6b*, *6c*, *6d*.

The animal from which this cuttlebone comes is unknown. It is 60 mm. long by 11 mm. broad at its widest part, with a maximum thickness of 4·75 mm. The dorsal surface is very slightly convex in its anterior two-thirds, but markedly curved in the posterior third. The mucro of 2·75 mm. in length projects at an angle of about 135°. The maximum width and thickness is at 20 mm. from the anterior end, which is sharply rounded. Posteriorly it uniformly narrows to a minimum of 3 mm., and at its extreme end terminates in a thin circular expansion, 4 mm. in diameter, which extends about 1·5 mm. beyond the base of the projecting spine.

An orange-coloured line arises at the margins at the point of maximum width, and becomes plainer and wider as it extends backwards, and more prominent ventrally till it projects nearly a millimeter in height, and is half a millimeter in width at the posterior end of the white substance, around which it circles. A longitudinal central furrow deepest just in front of the widest part of the shell, grows shallower and wider anteriorly, and nearly vanishes at the posterior end. Dorsally a very low rounded central rib increases posteriorly to a width of 3 mm., and midway between it and the margins of the bone is a scarcely perceptible longitudinal depression.

Its nearest ally is *S. elongata*, Fer and Orb, Céph Seiches, t. 24, f. 7-10, 1839; Tryon, Man. Conch., vol. i., p. 195, pl. xci., figs. 418, 419. *Hab.*, Red Sea. The animal of that species is also unknown. The sepiostaire as figured in Tryon is only 45 mm. long, is less attenuated posteriorly, has a comparatively wider hollow expansion at the posterior end, is curved for a much shorter length posteriorly, and has its spine not set at an angle, but curving backward, so as to continue the nearly straight dorsum of the bone. The chalky substance, too, seems much thicker, and to more suddenly decrease forward. The dimensions are not given in Tryon's text.

Hab.—The type was found at Glenelg by Master Bragg, and we have pleasure in naming it after him, and at the same time complimenting his father, Prof. Bragg, one of our most honoured Fellows, who has just been distinguished by the Fellowship of the Royal Society of London.

Mr. Zietz has also taken eight specimens during ten years' collecting on our beaches; so that it is a rare species here.

Mr. Hedley says it does not seem to occur on the Pacific coast of Australia, but he has it from Victoria.

Arcularia dipsacoides, Hedley. Pl. xxix., fig. 13.

Arcularia dipsacoides, Hedley, Records Austr. Mus., vol. vi., part 5, 1907, p. 359, pl. lxvii., f. 21. Type locality, 800 fathoms 35 miles E. of Sydney.

Dredged off Cape Jaffa, in 130 fathoms, 41 examples; in 300 fathoms, 10, all dead.

Two individuals were taken alive in 130 fathoms, off Cape Jaffa, and furnished radulæ. They contain about fifty-three rows, and are of the ordinary rachiglossa type. A large lateral with two well-curved simple cusps fold over a rachidian tooth with ten cusps, of which the outermost on each side is very small. In one individual, one cusp situated at the centre is the largest and has frequently five cusps on one side and four on the other. In the second individual, the middle two are largest. The rest vary very much in relative length in different rows, so that scarcely any two rachidian teeth exactly correspond.

Vermicularia flava, n. sp. Fig. 1.

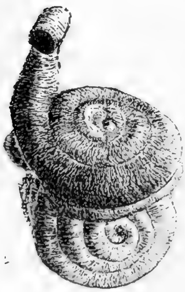

Fig. 1.

Shell an ochre-yellow-coloured tube, varying in diameter from 1 to 1·5 mm., moderately thick, coiled in flat discs of 5 or 6 mm. in diameter, each formed of three or four spirals; the discs are superimposed to form a cylinder. Section of tube circular. Surface has sinuous growth-lines, Ante-current at the margins of attachment to adjacent coils and at the centre of the free surface, varying in validity, sometimes erected into a collar. The anterior end stands free.

The type, after forming a flat cylinder of two discs, produces two more discs at right angles to these, and then has a free tube of 7 mm. length. The discs may be formed from the centre outwards, or from the circumference inwards. The free portion may be 15 mm. long. No nucleus has been seen.

Type locality.—130 fathoms, off Cape Jaffa; also in 90 fathoms, 37 dead; in 40 fathoms, off Beachport, one dead.

Mangilia spica, Hedley.

Records of the Austr. Mus., vol. vi., pt. 4, 1906, p. 297, pl. lv., fig. 20. Type locality, off Narrabeen, N.S.W., 80 fms., 2 examples, 100 fms., off Wollongong 1.

Dredged at 40 fathoms, off Beachport, one dead; and at 110 fathoms, one dead.

The South Australian shells vary from the type in having six spirewhorls instead of four; and the four earlier whorls are not quite so long as those which form the spire of the type, the axial ribs are more numerous, and are less marked below the suture.

Drillia hecatorguia, n. sp. Figs. 2 and 3.

Shell small, stout, biconic, whorls six. Protoconch flat, two smooth convex turns. Spirewhorls with a sharp medial angulation, undulated by pliciform tubercles (nine in the penultimate) plicæ reaching the lower suture; suture slightly adpressed. Growth-lines microscopic. Bodywhorl half as long as the shell; excavated below the suture, then acutely angled; faintly concave immediately below the angulation, then scarcely inflated, and next roundly contracted in the lower third. Tubercular plicæ wide, extend from the angle, soon become obsolete. Growth-lines faint, rude near the aperture. Sinus half as deep again as wide, bounded by the angle. Aperture oblique, length nearly four times its width, elongate-oblong. Outer lip simple, thin, convex. Columella convex in posterior half, straight anteriorly. Inner lip thin, applied, slightly spread, extending to suture. Anterior notch moderately wide. Colour translucent white, faintly tinged with brown.

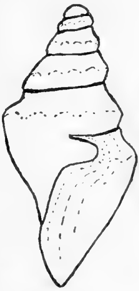

Fig. 2.

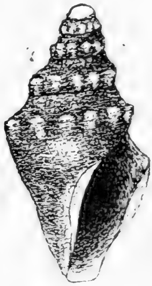

Fig. 3.

Dim.—Length, 6·1 mm.; breadth, 2·8 mm. Length of aperture, 3·2 mm. The largest example is 7 mm. long.

Type Locality.—104 fathoms, 35 miles south-west of Neptune Islands; 28 dead.

Nucula micans, Angas.

Nucula micans, Angas. Proc. Zool. Soc., Lond., 1878, p. 864, pl. liv., f. 16. Type locality, shell sand, Salt Creek; Glenelg, St.

Vincent Gulf: Tate, Trans. Roy. Soc., South Australia, 1887, vol. ix., p. 102, No 125; Tate and May, Proc. Linn. Soc., N.S. Wales, 1901, vol. xxvi., part 3, p. 435, "Tasmania"; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1904, vol. xvii. (N.S.), part 1, p. 237, "Victoria."

Locality.—Taken on the beach at MacDonnell, Rivoli, and Guichen Bays; many dredged alive in 5 fathoms, St. Vincent Gulf, and in 20 fathoms Backstairs Passage; valves dredged in Spencer Gulf, and also in 40 and 150 fathoms off Beachport, and one valve in 130 fathoms off Cape Jaffa.

Nucula beachportensis, *sp. nov.* Pl. xxvii., fig. 3.

Oval-trigonal, moderately solid. Umbos prominent, inflated, slightly opisthogyre, incurved. Teeth about thirteen anterior, solid and curved; six posterior. Fossa for the internal cartilage rather small, directed forwards and inwards. Dorsal border very slightly excavate just behind the fossa, then convex, then straight to the posterior inferior angle; ventral border with a uniform curve, joining with a smaller curve the anterior dorsal border, which has a very slight convex arcuation, and is about twice as long as the posterior. Inner ventral margin minutely crenulate.

Sculpture.—Smooth, but for obsolete rounded concentric striæ at irregular distances, and scanty microscopic radial striæ.

Dimensions.—Umbo-ventral, 4·6 mm.; antero-posterior, 4·9 mm.

Locality.—Dredged off Beachport, 40 fathoms, 1 perfect (type), 2 valves; in 100 fathoms, 1; 150 fathoms, 2; 200 fathoms, 1; off Cape Jaffa in 130 fathoms, 1; 300 fathoms, 6; all dead.

Diagnosis.—It is very like *N. micans*, Angas, but is a larger shell, is smoother, is not so uniformly rounded behind, but is truncated or straight from the end of the hinge to the ventral border, and the crenulations are fewer and more valid.

Nucula obliqua, Lamarck.

Nucula obliqua, Lamarck. Anim. s. Vert., 1819, vol. vi., p. 59; Chenu, Man. Conch., vol. ii., 1862, p. 179, f. 897; Hedley, Mem. Austr. Mus., 1902, iv., p. 292. *N. tumida*, Ten. Woods. Proc. Roy. Soc. Tasm., 1877 (1876), p. 111 (*non* Phillips, Illus. Geol. Yorkshire, 1836, part 2, pl. v., f. 15; *nec* Hinds, Proc. Zool. Soc., Lond., 1843, p. 98). Type locality, Eocene fossil, Table Cape, Tasm. *N. tenisoni*, Pritchard, Proc. Roy. Soc. Vict., 1896, vol. viii., p. 128.

Dredged off Cape Jaffa, in 90 fathoms, 1 valve; in 130 fathoms, 16 valves; in 300 fathoms, 1 alive, small, and 3 valves; off Beachport, in 110 fathoms, 34 valves; in 150 fathoms, 19 valves; in 200 fathoms, 24 valves.

Leda crassa, Hinds.

Nucula crassa, Hinds, Proc. Zool. Soc. Lond., 1843, p. 99. Type locality, Australia; *Leda crassa*, Hinds, Sowerby, Thes. Conch., vol. iii., 1860, p. 120, pl. 228, f. 69; Sowerby, Conch. Icon., 1871, vol. xviii., pl. 5, f. 27; Angas, Proc. Zool. Soc. Lond., 1877, p. 193; Ten. Woods, Proc. Roy. Soc. Tasm., 1878, p. 32; E. A. Smith, Chall., Zool., 1885, xiii., p. 237; Tate, Trans. Roy. Soc. South Austr., 1887, ix., p. 102, No. 126; Tate & May, Proc. Linn. Soc. N.S. Wales, 1901, xxvi., pt. 3, p. 435; Hedley, Mem. Austr. Mus., 1902, iv., pt. 5, p. 294; Pritchard & Gatliff, Proc. Roy. Soc. Vict., 1904, xvii. (N.S.), pt. 1, p. 238. *Leda chuva*, Gray in Juke's Voy. Fly., 1847, vol. ii., app. p. 356, pl. ii., f. 6; Sowerby, Thes. Conch., 1860, iii., p. 119, pl. 228, f. 67; Sowerby, Conch. Icon., 1871, xviii., pl. 7, f. 46.

Dredged, Investigator Strait, 14 fathoms, 8 alive; off Middleton, 17 fathoms, many alive, adult; 18 miles off Newland Head, in 26 fathoms, 24 alive, mostly small, and great numbers of very small examples; off Beachport, in 110 and 150 fathoms, 3 and 4 valves (Dr. Verco).

Leda dohrni, Hanley.

Leda dohrni, Hanley, Proc. Zool. Soc. Lond., 1861, p. 242. Type locality, Mare Pacificum (Mus. Dohrn). *Id.* Hedley, Thetis Exped., Memoirs Austr. Mus., iv., pt. 5, 1902, p. 294. *Leda dohrnii*, Hanley (A. Ad.), Sowerby, Conch Icon., xviii., 1871, Leda, pl. lx, f. 54. *Leda hanleyi*, Angas, Proc. Zool. Soc., 1873, p. 174, pl. xx., f. 7; *teste* Hedley, *loc. cit.*

Dredged off Beachport, in 110 fathoms, 6 valves; in 150 fathoms, 10 valves; off Cape Jaffa, in 130 fathoms, 7 valves (Dr. Verco).

Leda verconis, Tate.

Leda verconis, Tate, Trans. Roy. Soc. South Austr., 1891, vol. xiv., p. 264, pl. xi., fig. 4.

Dredged alive in Spencer's Gulf, as far up as Wallaroo Bay, also in St. Vincent Gulf, in Investigator Strait, and Backstairs Passage. It occurs alive at all depths from 8 to 22 fathoms, being very numerous at 8, at 15, and at 22 fathoms. None were taken in the depths from 45 to 300 fathoms.

Leda pala, Hedley.

Leda pala, Hedley, Records Austr. Mus., vol. vi., part 5, 1907, p. 361, pl. lxvi., fig. 1. Type locality, 800 fathoms E. of Sydney.

Dredged off Cape Jaffa, in 130 fathoms, 2 valves.

Leda miliacea, Hedley.

Leda miliacea, Hedley, Thetis Exped., Mem. Austr. Mus. iv., pt. 5, p. 295, fig. 43: valves, 63-75 fathoms off Port Kembla, and 41-50 fathoms off Cape Three Points.

Dredged in 300 fathoms off Cape Jaffa, 5 valves (Dr. Verco).

Poroleda ensicula, Angas.

Leda ensicula, Angas, Proc. Zool. Soc., 1877, p. 177, pl. xxvi., f. 27. Type locality, off Port Jackson Heads, 45 fathoms. *Id.*, Smith, Chall. Rep. Zool., xiii., 1885, p. 239. *Id.*, Hedley, Thetis Exped., Mem. Austr. Mus., iv., pt. 5, 1902, p. 293, fig. 41, *Id.*, Pritchard & Gatliff, Proc. Roy. Soc. Vic., xvii. (N.S.), pt. 1, 1904, p. 239.

Dredged off Beachport, in 100 fathoms, 2 valves, in 110 fathoms 12 valves, in 150 fathoms very many valves, in 200 fathoms 8 valves; off Cape Jaffa, in 90 fathoms 5 valves, in 130 fathoms 6 valves; off Cape Borda, in 60 fathoms 2 valves.

Sarepta obolella, Tate.

Leda obolella, Tate, Trans. Roy. Soc. S. Austr., vol. viii., 1886, p. 129, pl. v., figs. 3*a* and *b*. Type, a tertiary fossil from Muddy Creek. *Sarepta tellinœformis,* Hedley, Records Austr. Mus., 1901, vol. iv., p. 26, fig. 8; 75 fathoms 5 miles E. of Sydney Heads. *Sarepta obolella,* Tate; Hedley, Memoirs Austr. Mus., 1902, vol. iv., part 5, p. 295; off Port Kembla 63-75 fathoms, and Cape Three Points 41-50 fathoms.

Dredged off Cape Jaffa, in 300 fathoms, 1 whole, 6 valves.

Limopsis tenisoni, Ten. Woods.

Limopsis cancellata, Ten. Woods (*non* Reeve), Proc. Roy. Soc. Tasm., 1877 for 1876, p. 156. Type locality, north coast of Tasmania. *L. tenisoni,* Ten. Woods, Proc. Roy. Soc. Tasm., 1878 for 1877, p. 56; Hedley, Memoirs Austr. Mus., vol. iv., part 5, p. 297; Pritchard & Gatliff, Proc. Roy. Soc., Vic., 1904, vol. xvii. (N.S.), part 1, p. 245, "Victoria." *L. bassi,* E. A. Smith, Chall. Zool., 1885, vol. xiii., pp. 14, 256, pl. xviii., f. 6-6*a*, "East Moncœur Is., Bass Strait, 38 fathoms"; Tate, Trans. Roy. Soc. S. Austr., 1887, vol. ix., p. 103, No. 136, "South Australia"; Tate and May, Proc. Linn. Soc. N.S. Wales, 1901, vol. xxvi., part 3, p. 437.

Is abundant throughout St. Vincent and Spencer Gulfs, Investigator Strait, and Backstairs Passage, being taken alive at all depths from 10 fathoms up to 30 fathoms. One example was taken alive from 55 fathoms off Cape Borda, and valves have been dredged at all depths up to 130 fathoms off Cape Jaffa; none beyond this depth.

It is a very variable species. Some individuals are almost orbicular, others are extremely oblique, some have the radial sculpture very valid, others obsolete. The epidermis may be smooth, silky, and uniform, or disposed in marked concentric fringes. The brown colouration may be very deep and general, or only in certain parts, or nearly absent. But any attempt to separate into different species is vain.

Limopsis tenisoni, Ten. Woods; var. **penelevis,** *var. nov.*
Pl. xxvii., fig. 5.

Shell obliquely oval. Dorsal margin nearly straight. External surface with concentric growth lines, varying in validity, somewhat imbricating; dotted at their convex margins by short, disconnected, sublenticular radial impressions, more marked over the posterior part of the shell, and as the shell grows larger. Internal margin non-crenulated and flattened. Tooth-plate rather curved; about 14 teeth. Milk-white.

Dimensions.—Umbo-ventral, 16·5 mm.; antero-posterior, 15 mm.; sectional of the closed valves, 5·5 mm.

Locality.—Valves dredged off Cape Jaffa and Beachport from 90, 130, 150, 200, and 300 fathoms.

It differs from the ordinary form in the almost complete absence of radial sculpture.

Limopsis vixornata, *sp. nov.* Pl. xxvii., fig. 1.

Shell solid, white, equivalve, nearly equilateral, transversely orbicularly oval. Umbo acute, projecting well beyond the dorsal border, incurved. Inner margin smooth and flat. External surface smooth, but for concentric growth lines, which at fairly regular intervals are more valid, so as to form subdistant liræ. Under the lens traces of radial incisions are visible, especially over the posterior area. Cartilage pit triangular; 11 solid diverging teeth in a curved series. Interior closely radially striate.

Dimensions.—Umbo-ventral, 5·7 mm.; antero-lateral, 6·4 mm.; largest, 8·1 mm. by 9 mm. Some have a short, straight dorsal border, shorter anteriorly than posteriorly, and with the radial impressions rather more marked. One has an epidermis, worn away near the umbo, and projecting at the ventral margin for about a millimetre and a half as a continuous radially striated membrane, which on the surface of the shell breaks up into a hairy coating.

Locality. — Type from 45 fathoms, east of Neptune Islands, with 4 valves and 1 living specimen; from 49 fathoms, off Beachport, 23 valves; also at 55 and 62 fathoms, off Cape Borda, and 110 fathoms off Cape Borda.

Diagnosis.—The transversely oval shape, the prominent umbo, and the unsculptured surface separate it from *L. tenisoni*, Ten. Woods; but possibly it is only a variant.

Limopsis eucosmus, *sp. nov.* Pl. xxvii., fig. 2.

Shell solid, rather compressed, white, obliquely orbicular, slightly higher than wide. Umbos central, prominent, incurved approximate. Cartilage-pit small, triangular. Tooth-plate slightly curved; teeth, 5 anterior, 6 posterior, somewhat diverging. Inner margin flat and smooth. Interior obsoletely radially striate. Posterior muscle-scar large and long; anterior, short and narrow. Outer surface exquisitely sculptured with flat concentric ribs, varying greatly in width, some twice, some four times as wide as the interspaces; others are only cords, not so wide as the intervals. They are higher on their convex than their concave edge. Numerous radial liræ, increasing by intercalation, scallop the ribs more markedly along their concave than their convex margin, forming circular depressions in the interspaces. At the anterior and posterior areas of the shell these scallops become triangular rather than circular, and so form lozenges in the interspaces. Where the radials cross the ribs, if these are very narrow, they produce a tubercle with a central radial furrow; if wide, they cross as a lira, with a central furrow, and sometimes another radial furrow is found on either side of this.

Dimensions.—Umbo-ventral, 8 mm.; antero-posterior, 7·5 mm.; section of closed valves, 3·25 mm.; largest example, 10·5 mm. by 10·3 mm.

Locality.—Type, off Cape Jaffa, from 90 fathoms, with 1 other valve; 35 miles south-west of Neptune Islands, from 104 fathoms, 62 valves.

Limopsis erectus, Hedley and Petterd.

Limopsis erectus, Hedley & Petterd, Records Austr. Mus., vol. vi., part 3, p. 224, pl. xxxviii., figs. 14, 15. Type locality, 250 fathoms, off Sydney.

Dredged 35 miles south-west of Neptune Islands, 104 fathoms, 6 valves; off Beachport, 150 fathoms, 1 valve, 200 fathoms, 1 valve; off Cape Jaffa, 130 fathoms, 17 valves, and 300 fathoms, many small and mostly poor valves, but some with epidermis. The epidermis is abundant, of flaxen, bristly setæ, long towards the ventral border.

Nuculina (**Cyrilla**, A. Adams, s.g.) **concentrica**, n. sp.
Pl. xxvii., figs. 4, 4*a*, 4*b*.

Minute, obliquely-oval, equivalvular, inequilateral, higher than long, moderately solid, white, smooth, with six concentric equidistant imbricating steps. Umbos prominent, prosogyre, incurved, approximate. The front side at the upper third is oblique and nearly straight, being faintly incurved; then rather suddenly roundly angulated, beyond which it is uniformly openly curved. The posterior side has a uniform gentle arcuation, and the basal outline is distinctly more sharply curved. The hinge-plate is broad. The teeth of the left valve lie in front of those in the right valve, and the left lateral tooth lies outside the right. There are six cardinal teeth in each valve, all behind a pit lying beneath and slightly in front of the umbo. The three nearest the pit are nearly vertical and laminar, and rather close together; especially the first two; the posterior three become gradually more distant, stouter especially at their outer ends, shorter, and more diverging, lying perpendicular to the curving posterior margin. The last one in the right valve is peg-shaped. Behind, there is a rather long lamellar triangular tooth. The posterior muscle-scar is very large, curved, and oval, and placed low down beyond the lateral tooth. The inner margin is smooth and simple. The shell is covered with a dark-brown, smooth, shining, closely-adherent epidermis, which wears off dead shells, remaining last about the umbos. Dead shells are translucent, milky-white.

Dimensions.—Umbo-ventral diameter, 2·5 mm.; antero-posterior, 1·9 mm.; section of closed valves, 1·6 mm.; a large example is 3 mm. by 2·3.

Habitat.—104 fathoms, 35 miles south-west of Neptunes, many alive and dead, and valves.

Some Ostracoda, taken in the same haul, are very like them.

Lissarca pubricata, Tate.

Limopsis rubricata, Tate, Trans. Roy. Soc. South Austr., 1886, vol. ix., p. 71, pl. v., fig. 6. Type locality, alive from 32 fathoms, Backstairs Passage; *op. cit.*, p. 104, No. 138; Tate and May, Proc. Linn. Soc. N.S. Wales, 1901, vol. xxvi.; part 3, p. 437, Pirate Bay, Tasmania; Hedley, Memoirs Austr. Mus., 1902, vol. iv., part 5, p. 297, valves, 41-50 fms., off Cape Three Points; Pritchard & Gatliff, Proc. Roy. Soc. Vict., 1904, vol. xvii. (N.S.), part 1, p. 246, Western Port.

Taken alive in Backstairs Passage, 17 fathoms; dead in St. Vincent Gulf, and off Cape Borda, in 62 fathoms, dead, but perfect. It is recorded from Cape Borda, round the coast of Victoria and Tasmania, to New South Wales.

Tate remarks:—"Probably a young shell, but not referable to any known species." Abundant material proves it to be full grown, and a distinct species. There are 5 radial flames, increasing in width as they diverge. Tate gives four.

Lissarca rhomboidalis, n. sp. Pl. xxvii., fig. 7.

Shell minute, solid, translucent, horn-coloured, ovate-rhomboid, equivalve, inequilateral, about twice as long behind the umbo as in front. Umbos prominent, round, wide, slightly prosogyre. Dorsal border faintly uniformly curved, continuing into the narrowly-rounded anterior end, and into a much more widely-curved posterior end, which is faintly truncated behind. There is a perceptible excavation where the anterior end joins the ventral border. A narrow sub-umbonal area, bounded outside by a straight, slightly prominent rounded edge, is marked with numerous very close-set vertical striæ, and does not extend so far in front as behind, where it gradually narrows and vanishes. It is divided by a rather wide, shallow, subcentral triangular cartilage-pit. There are four anterior teeth perpendicular to the margin, and four posterior convexly curved towards the umbo; three or four small marginal teeth inside the anterior end, four at the post-dorsal margin, and three or four obsolete teeth at the post-ventral border. Margin otherwise simple. Posterior muscle-scar long, large, triangular. Crowded concentric, rather irregular accremental striæ, with very fine broken radial incisions.

Dimensions.—Antero-posterior, 2·4 mm.; umbo-ventral, 2 mm.

Locality.—MacDonnell Bay and Guichen Bay, in shell-sand.

Variations.—When dead they become white, the amber colour disappearing first about the umbo, and last about the ventral margin. Some show four obscure rounded radial ridges, from the umbo to the posterior inferior angle; and these may crenulate the margin. Dorsally to these the shell may be somewhat hollowed. The posterior marginal teeth may crenulate the border, as may also the front teeth.

Bathyarca perversidens, Hedley.

Bathyarca perversidens, Hedley, Memoirs of Australian Mus., 1902, vol. iv., part 5, p. 298, fig. 45. Type locality, off Port Kembla, in 63-75 fathoms, etc. Var.—*Bathyarca cybæa*, Hedley, Trans. New Zealand Inst., 1906, vol. xxxviii., 1905, p. 70, pl. 1, figs. 3-4. Type locality, 110 fathoms, east of Great Barrier Island, New Zealand.

Dredged off Cape Jaffa, in 130 fathoms, 2 valves; in 300 fathoms, very many valves.

A series was submitted to Mr. Hedley as *B. cybæa*, and he kindly compared with his types and confirmed the identification. A suggestion was also put forward that his two shells were variants of one species, and he allowed that my series seemed to bridge the interval between the two. Being persuaded they are conspecific, I have named them *B. perversidens*, which has priority, making *B. cybæa* a variant.

In all my specimens the right valves have much more pronounced sculpture than the left, especially the radial. Some shells have the sinuation at the gape quite deep, with the depression from this to the umbo marked, others but slight, and others not at all. Some have quite a distinct angle at middle of the posterior side, where a straight-dorsal half meets the rounded ventral part; in others the posterior side is continuously curved.

It is interesting to note the very wide area of distribution of this small species: over 36 degrees of longitude and in almost identical latitudes.

Philobrya cuboides, *sp. nov.* Pl. xxviii., figs. 5, 6, 7, 8, 9.

Shell minute, solid, subrhomboidal, inflated, equivalve, inequilateral, varying in different specimens. Anterior margin forming rather more than a right angle with the dorsal border, and straight for one-half its length, then sweeping with a large curve into the convex ventral margin. Posterior margin forming a more obtuse angle with the dorsal border, nearly straight throughout its whole length, and joining the ventral margin by a rounded angle. Umbos provided with adherent embryonal scales, which are thick, slightly more than a semicircle, their diameters almost opposed, their centres slightly prominent, the borders of their circumference, but not of their diameters, margined and slightly reflected. Infraumbonal ligamental area narrow and long. Hinge-line wide, of two parts joined at an open obtuse angle where it is narrowest. Cartilage-pit excavated in the ligamental area from the umbonal scale, directed obliquely backwards. Anteriorly to the pit are two stout, erect oblong teeth, directed backwards and inwards. Posteriorly are three stout, erect, nearly oblong teeth, directed almost transversely forwards and inwards.

Sculpture.—The surface has close-set, broad, low, radial ribs, and rather narrower concentric ribs, at about equal distances. The inner margin of the shell is denticulated; not at all, or only slightly on the straight parts.

Dimensions.—Umbo-ventral, 2·75 mm.; antero-posterior, 2·15 mm.; sectional of the closed valves, 1·5 mm.

Locality.—Backstairs Passage, 20 fathoms, 30 alive, many dead; Spencer Gulf, deep water, 13 alive.

Obs.—In life it is covered with a conspicuous thick periostracum, projecting as a hairy fringe along the ribs and beyond the margins. The shell is tinged throughout, or blotched with pinkish-brown.

Variations.—Typically the umbos are subcentral, rather nearer the anterior end of the hinge-line. In some specimens they are much nearer the front, when the cartilage-pit is longer and more oblique, and the whole shell is more oblique. The umbo-ventral diameter may be, in some instances, atypically greater than the antero-posterior. The dorsal border may be atypically short, and the dorso-lateral angles too obtuse, so as to give a circular rather than a quadrate outline to the margin of the shell.

Its exact generic location is somewhat doubtful.

Trigonia margaritacea, Lamarck, *var.* **bednalli**, *var. nov.*
Pl. xxviii., figs. 1, 2, 3.

Trigonia margaritacea, Lamarck, Ann. du Mus., vol. iv., p. 355, pl. lxvii., fig. 2. *T. pectinata*, Lamarck, Anim. S. Vert., 1819, vol. vi., p. 63: Encyc. Meth., 1832, vol. iii., p. 1048.

The shell here referred to was first taken on the South Australian shore, between Glenelg and the Semaphore, by Mr. W. T. Bednall, about the year 1865, and was catalogued by him in a list of South Australian shells, published (for private circulation only) in 1875, and was noticed in his excellent paper on "Australian Trigonias and their Distribution," in Trans. Roy. Soc. S. Austr., vol. i., 1878, p. 79, under the name of *T. margaritacea*, Lamarck. He said:—"Its particular habitats in our waters have not yet been discovered, no live specimens having yet been dredged." In vol. ix., pp. 101-102, Tate recorded it as having been "dredged in life from 8 fathoms in Encounter Bay (R. H. Pulleine)." A few years later, when I had the pleasure of Mr. Bednall's company on one of my earlier dredging excursions, we discovered it in St. Vincent Gulf, and obtained about 70 specimens, living and dead, from 15 to 20 fathoms, in Yankalilla Bay. Dredging since then has revealed a considerable range, both in depth and area, as shown by the following details:—It has been taken alive at 10 fathoms, 2 small examples; 12 fathoms, 7; 14 fathoms, 3; 15 fathoms, 3; 17 fathoms, 15; 19 fathoms, 16; 15 to 20 fathoms, about 50; 22 fathoms, 18. They have been taken as valves from 9 up to 200 fathoms. They have extended from Wallaroo Bay, at 15 fathoms, throughout Spencer Gulf, through Investigator Strait, in St. Vincent Gulf, as far up as Yankalilla Bay, and through Backstairs Passage. Beyond this, as far as Beachport, where I have only tested at depths from 49 to 300 fathoms, none but dead specimens have been obtained; though 1 example, the largest in my cabinet, perfect, and quite recent, and of a white colour, was brought up from 110 fathoms at this most easterly of my stations. Their zone is manifestly from 12 to 23 fathoms, only stragglers occurring at less depths, and dead shells at greater depths.

They are very varied in colour, white, pale yellow, light orange, delicate mauve, pink, "crushed strawberry," and purple.

This variety is characterized by its very compressed shape, its narrow ribs, its large, oblong, plate-like spines, broader at their free than at their attached ends, features which are exceedingly constant in the very large series obtained. *T. lamarckii, var. reticulata*, Ten. Woods, found off the coast of New South Wales, is regarded by Mr. Hedley as the same species, as is also *T. acuticostata*, McCoy (Memoirs Austr. Mus., iv., part 5, 1902, p. 301).

The late Mr. Dennant kindly compared our South Australian shells with McCoy's fossil form from Victoria, and he thought they were not identical, nor conspecific with *T. reticulata*, Ten. Woods. However, I think it is too closely allied to be regarded as a distinct species, so it has been placed as a variety of *T. margaritacea*, Lamarck.

Among the many hundreds of valves and living specimens dredged by me, only 1 has shown any marked departure from the type of this variety. This was taken alive at 23 fathoms in St. Vincent Gulf, together with 2 others, which quite conformed to the type. This unique individual exactly resembled a half-grown specimen of the common *T. margaritacea*, Lam., obtained from Tasmania. The only other aberrant from our form seen by me is a specimen taken by Mr. Zietz, at Corny Point, Spencer Gulf. It has the spines of *T. margaritacea* and the same number of ribs, but the shape is more that of *T. lamarckii*, found in Port Jackson, only with fewer ribs and fewer spines, and with an even longer and more concave posterior border, in which last character it departs greatly from our South Australian variety. The occurrence of these two marked aberrants among numerous examples of the ordinary form indicates some other explanation for our variety than either locality or depth of water

Modiola penetecta, n. sp. Pl. xxviii., figs. 15, 16, 17, 18.

Shell small, thin, ovate, ventricose. Beaks apposed, inflated, oblique. Post-dorsal line nearly straight, 11 mm.; anterior-dorsal line, 2 mm. Ventral border anteriorly slightly convex for 8 mm.; then rather more convex, and merging into the semicircular posterior end, which, with a more open dorsal sweep, forms a faint rounded angle with the post-dorsal line. A heart-shaped area, 10 mm. by 8 mm., on the united valves anteriorly is bare and glistening and sculptured with very low lamellar accremental striæ. The rest of the shell is very closely invested with a felted periostracum of short hairs, with short, blunt projections on each side. Internal border simple. Horn-coloured, lighter on the umbonal ridge. Internally chestnut-brown in front, and with pinkish-brown concentric bands, most marked, in the dorsal two-thirds, elsewhere a bluish-white.

Length, 21 mm.; breadth, 13 mm.; thickness, 11 mm.

It differs from *M. australis*, Lamarck, in its shorter, rounder, anterior end, its greater proportional breadth, and its rounder posterior end. Its hairs are more numerous and close-set, shorter, and "elk-horn" in shape, instead of simple.

Habitat.—Dredged alive in numbers in mud at 10 fathoms, off Banks Islands, and at 15 fathoms in Wallaroo Bay, Spencer Gulf.

Glycimeris pectinoides, Deshayes. Pl. xxviii., fig. 4.

Pectunculus pectinoides, Deshayes, Cuv., Régn. Anim (Fortin and Masson's illustrated edition), Mollusques, pl. lxxxvii., f. 8. Illustrations Conchyliologiques, Chenu, *Pectunculus*, pl. ii., f. 2: Reeve, Conch. Icon. *Pectunculus*, pl. viii., f. 44. *Pectunculus gealei*, Angas, Proc. Zool. Soc. Lond., 1873, p. 183, pl. xx., f. 5. Type locality, off Port Macquarie, N.S. Wales. Tate, Trans. Roy. Soc. S. Austr., 1891, vol. xiv., part 2, p. 268; *(Glycymeris)*, Tate & May, Proc. Linn. Soc. N.S. Wales, 1901, vol. xxvi., part 3, p. 436. *Pectunculus flabellatus*, Ten. Woods, Trans. Roy. Soc. Vict., 1878 (1877), vol. xiv., p. 61, 62. Type locality, Victoria and Tasmania: Tate, Trans. Roy. Soc. S. Austr., 1886, p. 103, No. 134: *(Glycimeris)*, Pritchard and Gatliff, Proc. Roy. Soc. Vict., 1904, vol. xvii. (n.s.), part i., p. 243. *Pectunculus orbicularis*, Angas, Proc. Zool. Soc. Lond., 1879, p. 420, pl. xxxv., f. 9. *Pectunculus beddomei*, E. A. Smith. Chall., Zool., 1885, vol. xviii., p. 255, pl. xviii., f. 1, 1b.

Our South Australian shell was first recorded by Tate as *P. flabellatus*, Ten. Woods, in 1886; later as *P. gealei*, Angas, in 1891. The species figured by Chenu as *P. pectinoides*, Deshayes, and described and figured by Reeve as *P. pectenoides*, cannot be distinguished from a half-grown example of our shell. Reeve gives "Bay of Panama" as its locality, and says:—"After receiving from M. Deshayes the example of this species, originally described by him, Mr. Hinds supplied me with finer specimens from the collection of Captain Belcher." The habitat is far distant, but our shells appear conspecific.

It is not a common shell on our beach, but is fairly abundant in deeper water. It has been dredged in Spencer Gulf from Wallaroo Bay to Thorny Passage, in Investigator Strait, in St. Vincent Gulf, and through Backstairs Passage as far as Beachport. It has been taken alive at all depths between 8 and 30 fathoms, but is most numerous about 22 fathoms. Valves have been secured at all depths explored up to 150 fathoms off Beachport in decreasing quantities.

It is a very variable shell. When young it has an orbicular shape, being rather longer than high, and having a long, straight dorsal border. As it grows, it becomes higher than long, and its dorsal border is proportionally much shorter. It generally remains almost symmetrical; rarely it becomes quite decidedly oblique.

It may vary in obesity. One example, 41 mm. high, may be 30 mm. in section; another, 37 mm. high, may be only 20 mm. in section. The latter are of the compressed *P. bed-*

domei form. It is not explained by senility, for in young individuals an equal disparity is seen.

It may attain a height of 50 mm., a length of 51 mm., and a section of 35 mm.

The ribs differ. Generally they are broad and rounded, wider than the interspaces, which are deep and flat, with vertical sides. But sometimes the ribs are low and wide, and touch one another, so as to have no intervening squarely-ploughed furrow. The concentric sculpture usually consists of flattened contiguous plates on the ribs, while in the intercostal spaces there are low, vertical, thin lamellæ. But it may be no more than crowded concentric liræ, both on the costæ and between them.

The "lunular area" referred to by Angas is on the posterior side of the shell, and therefore does not correspond with the lunule of such shells as Chione. It may be very defined, or only slightly marked or absent.

Not a few individuals, after reaching a diameter of 25 mm., cease to grow in superficial area, but increase in sectional diameter, while they actually decrease in their umboventral; so that their margin becomes curiously incurved and their walls very thick, as figured in pl. xxviii., fig. 4.

As to ornament, some shells in life are nearly white without and quite white within; others are of an almost uniform cinnamon-brown. The usual colour is a dirty-greyish or very faint rusty tint, with rather reddish-rusty indistinct blotches, disposed in irregular and broken cencentric lines; but they may have a pure white-ground colour, marked with long radial, dark purple-brown spots, variously disposed in patterns, or scattered, or coalescing into a large area over the ventral part of the posterior half of the shell.

So within, some are quite white; others have a dark-brown line along the pallial margin, and edging each adductor scar; others have the muscle-scars and the greater part of the interior of a dark purple-brown.

The extent to which the muscle-scars, anterior or posterior, are supported by a callosity also differs greatly.

There is every combination of the above-named differences, so that no true varieties can be established: only individual variations are recognized.

Glycimeris sordidus, Tate.

Pectunculus sordidus, Tate, Trans. Roy. Soc. S. Austr., 1891, vol. xiv., p. 264, pl. xi., f. 8. Type locality, St. Vincent Gulf, 9 to 11 fathoms, alive (Verco). I have taken it since in numbers in Hardwicke Bay, in Backstairs Passage, and in Investigator Strait, at all depths from 13 to 22 fathoms.

Professor Tate had only an immature individual from which to describe his new species, and the figure given is a rather faulty representation of his type. Material obtained since furnishes the following information, and establishes it as a true species.

The dimensions given are:—Antero-posterior, 20 mm.; umbo-ventral, 18; sectional diameter, 10·5. My largest example measures 36 by 37 by 19·5. As it grows it therefore tends to become comparatively shorter antero-posteriorly, and more obese in section. Two individuals, each 32·5 and 33 mm. in the above measurements, have respectively sectional diameters of 20 and 16 mm., demonstrating very great difference in ventricosity.

There is a marked tendency to rest-periods in its growth, producing, at intervals of about 5 millimetres, concentric steps from a half to one millimetre in depth. There are usually four of these in the adult; there may be six. Then they rapidly become closer and less valid, until the senile stage is reached, when the shell increases much in obesity and very little in altitude, and they are reduced to close-set concentric striæ.

The species is appropriately designated "sordidus," for most shells show scarcely any colour markings on their dirty-white surface. But some are irregularly sparsely dotted with reddish-brown, in somewhat zigzag concentric lines, and are ornamented with four broad, curved, dark purple-brown flames, crossing the anterior and posterior marginal areas of the shell.

Thracia myodoroides, E. A. Smith.

Thracia myodoroides, E. A. Smith, Chall. Zool., 1885, vol. xiii., p. 70, pl. vi., f. 6-6b. Type locality, off East Moncœur Island, Bass Strait, in 38 to 40 fathoms: Pritchard & Gatliff, Proc. Roy. Soc. Vict., 1903, vol. xvi (n.s.), part i., p. 104.

This shell was recorded for South Australia by Professor Tate under the name of *Thracia modesta*, Angas, from Tapley Shoal, in Trans. Roy. Soc. S. Austr., 1888, vol. xii., p. 67.

It has been dredged alive at all depths between 8 and 22 fathoms; most abundant at 20 to 22 fathoms. Valves are found at all depths up to 60 fathoms; most numerous between 15 and 22 fathoms. It is fairly abundant, and is distributed from Beachport westward through Spencer and St. Vincent Gulfs.

As the shell grows larger, it changes in shape, becoming proportionally longer antero-posteriorly; thus the type is 13 mm. long by 9·5 mm. high. Other individuals are 16 by 10 and 18 by 11, whereas they should be 11·6 and 13·1 in height respectively.

Thracia concentrica, n. sp. Pl. xxviii., figs. 12, 13, 14.

Shell, rhomboid-oval; anterior-dorsal border straight, scarcely convex; posterior-dorsal border rather more concave; ventral-border uniformly slightly convex, joining the anterior border with a sharp curve; posterior end nearly vertically truncate, scarcely rounded at the superior angle, more at the inferior. A rounded umbonal ridge curves to the posterior inferior angle. Numerous valid, round, rude, incomplete, ill-curved concentric ribs frequently overlap in the median area. Fine crowded, crooked, radial incisions cross the ribs and spaces, and interrupt more crowded concentric incisions, so as to produce a microscopic shagreen pattern. There is a depressed lanceolate dorsal area behind the umbo, at the margin of which the ribs cease, and which is finely antero-posteriorly striate. In the right valve is a very narrow furrow within the dorsal borders for the edge of the left valve, and its inner margin behind the umbo projects as a laminar tooth, soon vanishing posteriorly. The inner surface is glistening, and has faint radial substriations. The pallial sinus is of moderate depth and round.

Dimensions.—Umbo-ventral, 10·8 mm.; antero-posterior, 14·1; sectional, 4·9.

It has not been dredged alive or with united valves, and one cannot be certain about its left valve.

It closely resembles *T. myodoroides*, of Smith, but is more ventricose, has a concave post-dorsal border, and is much more validly concentrically ribbed.

Habitat.—23 fathoms, Backstairs Passage.

Thracia lincolnensis, n. sp. Pl. xxviii., figs. 19, 20, 21.

Shell, thin, white, elongate-oval; anterior-dorsal border nearly straight, scarcely convex; posterior cancave; ventral border almost straight in the posterior half, arcuately ascending in the anterior. Anterior end attenuately rounded, posterior end vertically, straightly truncate; superior and inferior posterior angles rounded. Right valve slightly more convex than the left, which is included all round except at the posterior end. Quite obsolete, flat, irregular concentric ribs, with very faint miscoscopic concentric striæ. The right valve has a groove inside its dorsal margin, except at the umbo, to receive the left valve, and the inner edge of the groove projects to form lamellar teeth, most marked just in front of and behind the subumbonal notch. The pallial sinus is wide and round, and reaches nearly to the centre of the shell. The umbos are acute, incurved, and apposed.

Dimensions.—Antero-posterior, 7·3 mm.; umbo-ventral, 5·1 mm.; sectional, 3 mm.

It somewhat resembles *T. myodoroides*, E. A. Smith, but is smaller, though its proportions are the same. It differs in having a concave instead of a straight post-dorsal line, in not being excavate in front of the umbo, and in having a deeper pallial sinus.

It differs from *T. modesta*, Angas, in being longer posteriorly, and so more equilateral, and in a vertical truncation instead of one sloping upwards and backwards.

Habitat.—Dredged alive at 9, 20, 22, and 24 fathoms, at Port Lincoln, at Yankalilla Bay, and in Backstairs Passage.

Pholadomya arenosa, Hedley.

Thraciopsis arenosa, Hedley, Proc. Linn. Soc. N.S. Wales, 1904, vol. xxix., part i., p. 197, pl. ix., figs. 26-27. Type locality, 100 fathoms, east of Wollongong, N.S. Wales, one valve.

Pholadomya arenosa, Hedley, *op. cit.*, 1906, vol. xxxi., p. 464, Masthead Island, Queensland.

Mr. Hedley has kindly identified my specimens by comparison with his type. Its dimensions were only 4·55 mm. by 2·9 mm; a valve taken in 20 fathoms in Backstairs Passage measures 12 mm. by 7 mm. The typical shape and ornament are retained when adult.

Dredged alive in 5 fathoms, St. Vincent Gulf; dead in Spencer Gulf, Backstairs Passage, and in 62 fathoms northwest of Cape Borda.

EXPLANATION OF PLATES.

Plate XXVII.

Fig. 1. *Limopsis vixornata*, Verco.
,, 2. *Limopsis eucosmos*, Verco.
,, 3. *Nucula beachportensis*, Verco.
,, 4. 4*a*, 4*b*. *Nuculina (Cyrilla) concentrica*, Verco.
,, 5. *Limopsis tenisoni*, Ten. Woods, var. *penelevis*, Verco.
,, 6. 6*a*. 6*b*, 6*c*, 6*d*. *Sepia braggi*, Verco.
,, 7. *Lissarca rhomboidalis*, Verco.

Plate XXVIII.

Fig. 1, 2, 3. *Trigonia margaritacea*, Lamarck, var. *bednalli*, Verco.
,, 4. *Glycimeris pectinoides*, Deshayes; senile state.
,, 5, 6, 7, 8, 9. *Philobrya cuboides*, Verco, showing exterior, interior, dorsal view, and umbonal scale.
,, 12, 13, 14. *Thracia concentrica*, Verco, showing minute sculpture, side view, and dorsal view.
,, 15. Hair from *Modiola australis*, *Lamarck*.
,, 16. Hair from *Modiola penetecta*, Verco.
,, 17, 18. *Modiola penetecta*, Verco.
,, 19, 20, 21. *Thracia lincolnensis*, Verco, side view, dorsal view, and imaginary umbo-ventral section.

Further Notes on Australian Coleoptera, with Descriptions of New Genera and Species.

XXXVII.

By the Rev. T. Blackburn, B.A.

[Read October 1, 1907.]

HYDROPHYLLIDÆ.

Cercyon.

I attribute the following species to *Cercyon* with no little doubt whether it ought not to be treated as the type of a new allied genus. But as its distinctive structural characters may perhaps be regarded as simply modifications of the *Cercyon* type, I have ventured to include it provisionally in *Cercyon*. Its tarsi are shorter and stouter than in any other *Cercyon* known to me, but notably longer than those of *Megasternum;* the basal joint of the hind tarsi only very slightly longer than the 2nd joint. The 3rd joint of the maxillary palpi is much shorter than the 4th. The middle part of the metasternum is an abruptly-elevated flat and brilliantly nitid area of obcordate shape, the rest of the segment opaque owing to the presence of very fine confluent sculpture. The mesosternal keel is long and well defined, but very narrow; linear in fact. The prosternal keel is normal. The elytra are without any trace of striation. I do not find any other distinctive character likely to be generic.

C. kingense, sp. nov. Ovale; nitidum; piceo-nigrum, antennis (clava excepta) palpis pedibusque rufis, corpore subtus et elytris apicem versus plus minusve rufescentibus; exemplorum nonnullorum prothorace rufescenti; capite pronotoque crebre (hujus lateribus magis sparsim) subtiliter punctulatis; elytris haud striatis, subcoriaceis et puncturis subtilissimis sed perspicuis sat crebre impressis; prothorace fortiter transverso, antice parum angustato, lateribus leviter arcuatis, angulis omnibus obtusis; carina mesosterni perangusta sat elongata, prosterni sat elevata; tarsis sat brevibus sat robustis, articulo basali quam 2^{us} parum longiori. Long., 1-1½ l.; lat., ½ l. (vix.).

Under a microscope the coriaceous appearance of the elytra is seen to be caused by a reticulation of sharply-defined scratches.

King Island (Mr. A. M. Lea).

Cryptophagus.

C. tasmanicus, sp. nov. Elongatus; parallelus; modice convexus; pubescens; totus ferrugineus; antennis sat robustis, articulis 9° 10° que fortiter transversis (hoc quam ille nonnihil longiori nonnihil latiori); capite pronotoque crebre subtilius punctulatis; hoc leviter transverso, ante scutellum plus minusve gibbo, utrinque ad angulum anticum tuberculum sat magnum ferenti, lateribus parum arcuatis haud dentatis, angulis posticis sat rectis; elytris crebre subtilius punctulatis, circa scutellum sat fortiter gibbis.

Maris tarsis heteromeris, anticis sat dilatatis; feminæ tarsis pentameris simplicibus. Long., 1 l.; lat., $\frac{1}{4}$ l.

Resembles *C. gibbipennis*, Blackb., in the gibbosity of the elytra around the scutellum, but differs from it, *inter alia*, by the presence of a conspicuous tubercle immediately within the anterior angles of the pronotum, and by the much finer and closer puncturation of the elytra.

Tasmania (Mr. A. M. Lea).

Myrabolia.

M. longicornis, Blackb. Two specimens from Tasmania sent by Mr. Lea differ from the type in their very small size (scarcely exceeding 1 l. in length), and by the anterior sinuation of the sides of the pronotum being scarcely traceable. It is possible that they represent a distinct species.

M. parva, Blackb. A Tasmanian example of *Myrabolia*, sent by Mr. Lea, is of distinctly narrower build than the type, and its prothorax is a little more strongly transverse. These differences are, perhaps, sexual.

Trogoderma.

T. rigua, Er. Among the King Island *Coleoptera* lately taken by Mr. A. M. Lea are two specimens of a *Trogoderma*, which in all probability represent this species. They agree very well with Erickson's description in every respect except the pilose markings of the elytra, and are evidently abraded. *Rigua* is described as having four fasciæ and an apical spot formed of white pilosity on its elytra. In one of the examples before me there is a subbasal white fascia, exactly as described, and obscure traces of white pilosity in other parts, which may well be the remains of fasciæ. In the other example there is scarcely any trace of fasciæ, but there are some white hairs close to the apex, which are likely to be the remains of a white spot. I am fairly confident in making this identification because *T. rigua* is described as presenting some characters unusual among the Australian *Trogodermata* which are well marked in this insect, especially that of the large three-jointed antennal club and the very close puncturation of the pronotum. I have seen no *Trogoderma* but this one having antennæ agreeing with Erickson's description. In my tabulation of the Australian species of *Trogoderma* (Trans. Roy. Soc., S.A., 1903, p. 162) this species would stand beside *T. Adelaidæ*, Blackb., from which it differs, *inter alia*, by the club of its antennæ three-jointed (at any rate in one sex), and the puncturation of its pronotum much closer still than in *Adelaidæ* (entirely confluent, in fact). In a former Memoir (Tr.R.S.S.A., 1891, p. 130) I formed a new genus, *Adelaidea*, for a South Australian *Dermestid* widely separated from *Trogoderma* generically but agreeing so well as a species with the description of *T. rigua* that I expressed a doubt as to whether it might not be possible that it was the species on which Erickson's description was founded. The study of these King Island specimens is conclusive against that conjecture.

LAMELLICORNES.

COPRIDES.

Onthophagus.

O. ocelliger, Har. I have received from Mr. French several specimens (both sexes) taken in the far north of Western Australia which I refer to this species. They agree well with the description, but two of them depart from it in having their eyltra more or less spotted with red. They are extremely close to *O. asper*, Macl., but differ from it in being a trifle smaller; with the pronotum somewhat more nitid, not quite so closely punctulate, devoid of the small tubercle that occupies the middle of the front margin in (at least one sex of) *asper*, and having its base distinctly margined in the middle. The sexes do not differ much *inter se;* the front tibiæ of that which I take to be the male are a little longer and more slender, and the pygidium of the same a little more convex than in the other sex. The presence of a distinct fine line margining the middle part of the base of the pronotum places this species (in my tabulation of *Onthophagus*, Tr. Roy. Soc., S.A., 1903, pp. 267, etc.) in Group V., where it falls beside *O. henleyensis*, Blackb., from which, however, its pilosity, closer puncturation of pronotum, unequal elytral interstices, and very much smaller size, separate it widely.

O. carmodensis, sp. nov. Sat latus; supra glaber; subtus pilosus; modice nitidus; niger, antennarum clava flava, tarsis rufescentibus; clypeo antice fortiter emarginato; capite æquali, antice ruguloso, postice fere lævi; oculis sat latis lævibus; prothorace quam longiori ut 19 ad 11 latiori, supra obsolete (vix perspicue) punctulato, supra æquali (foveis sublateralibus exceptis), lateribus ante medium haud (pone medium fortiter) sinuatis, angulis anticis fere rectis subproductis postis obtusis bene definitis, basi tota subfortiter elevato-marginata; elytris nitide minus subtiliter crenulato-striatis, interstitiis leviter convexis coriaceis vix manifeste punctulatis; pygidio sparsim minus subtiliter (metasterno ad disci latera sat fortiter) punctulato; unguiculis sat magnis ut *O. Kingi*, Har., ad basin abrupte curvatis. Long., $4\frac{1}{2}$ l.; lat. $2\frac{4}{5}$ l.

The presence of a distinct raised edging along the base of the pronotum places this species in Group V. in my tabulation of *Onthophagus (loc. cit.)*, where it falls beside *O. Helmsi*, Blackb., and *O. Koebelei*, Blackb., from both of which it is distinguished by its very much larger size and *inter alia* by the absence of distinct punctures on its pronotum. The adoption of the sculpture of the base of the pronotum as the character on which to found primary divisions of *Onthophagus*, although the most satisfactory that I can find, undoubtedly divides into separate groups some species that seem more suited from their general appearance to be placed near each other, and the present insect furnishes a case in point, as the species to which it bears most resemblance are in Groups IV. and VI., especially *Kingi*, Har., *parvus*, Blanch., *Murchisoni*, Blackb., *submuticus*, Blackb., *inermis*, Macl., and *muticus*, Macl., from all of which, except *Murchisoni*, it is at once separated by the emarginate apex of its clypeus; while from *Murchisoni*, besides the character already mentioned, it differs, *inter alia*, by the structure of its hind claws. I am doubtful of the sex of the type of this insect, but consider it to be probably a female, as its front tibiæ are only moderately slender and the teeth of their external margin are extremely long and stout.

North-Western Australia (from Mr. French); Carmod Bay.

SYSTELLOPIDES.

I have recently received two species appertaining to this subfamily, of which one agrees with the diagnosis of the genus *Trichelasmus*, the other with that of *Enamillus*. The distinctness, *inter se*, of those two genera is based upon the number of joints in the antennal flabellum,—a character that seems to me of no value at all from a generic point of view,—and I am convinced that they ought to be regarded as representing only one genus. As, however, I have not seen either of the species for which the names were proposed it would be unwise actually to suppress either name at present and therefore I shall provisionally use both Dr. Sharp's names for the species before me. Dr. Sharp says that his *T. pilicollis* and *E. striatus* are excessively like each other; a similar statement may justifiably be made regarding the two species I am about to describe. The question arises whether it may be that *Trichelasmus* is the female of *Enamillus;* but I think it must be answered in the negative, although certainly it seems a suspicious circumstance that each genus should contain two species, not very like each other superficially, but each extremely like one in the other genus. The objection to regarding the difference between these two aggregates as sexual are as follows (at any rate in respect of the two forms before me):—*(a)* In no species known to me of the Australian *Melolonthides* is there, strictly speaking, a difference between the number of joints in the antennal flabellum of the male and the female; where such a difference has been recorded it has been founded on the fact of the basal joint or joints of the flabellum in the female being so slightly prolonged as to have been (incorrectly) excluded from the flabellum, whereas of the species before me one has basal three and the other only basal two joints devoid of any inner prolongation whatever; *(b)* in one of the forms before me the antepenultimate joint of the maxillary palpi is considerably longer than the penultimate; while in the other the corresponding joints are of equal length; *(c)* the striation of the elytra is notably different in the two forms; *(d)* in the specimen before me which is evidently Sharp's *Trichelasmus* the ventral segments are of the male type (shorter and more crowded together, with the apex of the pygidium slightly inclined towards the ventral segments) but its antennal flabellum is of the female type (if the two were considered to be sexes of one species), whereas in the specimen that is Sharp's *Enamillus* the ventral segments (on the supposition of the two forms being sexes of one species) would point to its being the female and the antennal structure to its being the male; *(e)* having before me two specimens of the *Trichelasmus* form, I find that in one of the specimens there is a large, circular, deep fovea in the centre of the pygidium which may possibly be accidental, but which on the other hand not improbably indicates that I have both sexes of *Trichelasmus* before me.

Enamillus.

E. Mauricei, sp. nov. Piceo-niger, pruinosus, antennarum stipite ferrugineo, elytrorum partibus 2 basalibus læte rufis; corpore subtus fronte pronoto scutelloque longe fulvo-pilosis; labro subnitido lævi leviter transverso, quam clypeus vix angustiori; clypeo subnitido crebre subtilius ruguloso; fronte opaca obsolete rugulosa; palporum maxillarium articulo antepenultimo quam penultimus sat longiori; antennis 9-articulatis, articulo 3° intus angulato, flabello magno 6-articulato arcuato articulis intus confertim breviter pilosis (articulis apicali basalique subtus circum ceteros intortis); prothorace opaco quam longiori duplo latiori, antice leviter angustato, supra obsolete vix crebre punctulato, lateribus sat arcuatis, angulis omnibus rotundatis, basi utrinque sat fortiter sinuata; scutello permagno, ut pronotum punctulato; elytris opacis perspicue nec fortiter 9-striatis, striis punctulatis geminatim ordinatis, interstitiis sparsim obsolete punctulatis sat planis; pygidio nitido sparsim subtilius punctulato; tibiis articis extus fortiter bidentatis, posticis brevibus valde incrassatis; tarsis posticis sat robustis modice elongatis, articulo basali quam 2^{us} paullo longiori; coxis posticis quam metasternum sat brevioribus; segmento ventrali apicali postice haud emarginato. Long. 7 l.; lat. $3\frac{3}{5}$ l.

The description of *E. striatus*, Shp., is so brief that it is not practicable to specify the distinctions between it and the present insect further than by mentioning that the larger size of *E. Mauricei* and the red colouring of the basal two-thirds of its elytra no doubt sufficiently distinguish it. I have called the front area (of the three areas into which the head is divided) the "labrum," although I am doubtful whether that area is really a true labrum. Dr. Sharp calls it the labrum, while Lacordaire considers it a part of the clypeus. The sculpture of the front tibiæ (which have only a single external tooth above the apical projection) is not usual in the Australian *Melolonthides*. The Systellopides form a most interesting and isolated group of *Lamellicornes*.

Central Australia (Musgrave Ranges). Taken by the explorer, R. P. Maurice. Type in S.A. Museum.

Trichelasmus.

T. basalis, sp. nov. Piceo-niger, pruinosus, antennarum stipite labro palpis elytrorum macula magna basali pedibusque læte rufis; corpore subtus fronte pronoto scutelloque longe fulvo-pilosis; labro nitido, fere lævi, quam longiori plus quam duplo latiori, quam clypeus haud angustiori; clypeo sat nitido crebre minus subtiliter ruguloso; fronte opaciori quam clypeus vix aliter rugulosa; palporum maxillarium articulis penultimo antepenultimoque longitudine sat æqualibus; antennis 9-articulatis, articulo 3° intus haud angulato, flabello sat magno 5-articulato arcuato articulis intus confertim breviter pilosis (articulis apicali basalique subtus circum ceteros intortis); prothorace opaco quam longiori fere duplo latiori, antice sat fortiter angustato, supra acervatim leviter punctulato, lateribus sat arcuatis, angulis anticis bene definitis sat rectis posticis subrotundatis, basi utrinque sat fortiter sinuata; scutello magno opaco leviter vix crebre punctulato; elytris opacis 4-striatis, parte dimidia laterali haud perspicue striata, striis nonnihill geminatim ordinatis, interstitiis planis confertim subtilissime subasperis; pygidio pernitido sparsim leviter punctulato; tibiis anticis extus fortiter bidentatis posticis brevibus sat fortiter incrassatis; tarsis posticis modicis, articulo basali quam 2^{us} sat longiori; coxis posticis quam metasternum sat brevioribus; segmento ventrali apicali postice haud emarginato. Long., 6 l.; lat., $3\frac{1}{5}$ l.

The description of *T. pilicollis*, Shp., is brief and does not mention many characters available for comparison with the present insect. The large red basal spot (occupying about a third part of the area of the elytron) on each of the elytra of *T. basalis* is, however, no doubt a distinctive character; and Sharp's statement that the labrum of his species is "very large" clearly indicates specific difference. I am disposed to think that I have both sexes of this species before me, not only because the large round forea on the pygidium of one of them seems not unlikely to be sexual, but also because the hind tarsi, in the specimen having the foveate pygidium, are distinctly (though not very much) more robust than in the other specimen.

Western Australia: Esperance Bay (Mr. French).

SAROTHROMERUS (*gen. nov., Systellopidarum*).

Mentum leviter transversum antice rotundatum; palpi labiales breves, ad basin haud contigui, articulo apicali subconico; palpi maxillares robusti modice elongati, articulo 2° quam 3^{us} sat longiori quam 4^{us} sat breviori; labrum (? clypei pars antica) quam clypeus (? quam clypei pars postica) fere duplo angustius; oculi reniformes; sutura inter frontem clypeumque haud carinata; antennæ 9-articulati, flabello 6-articulato, flabelli laminis (? maris solum) gracilibus intus setis robustis plurimis elongatis (his subtiliter pilosis) fimbriatis; prothorax fortiter transversus; scutellum permagnum transversum; elytra geminato-striata; corpus supra glabrum, subtus pilosum; coxæ posticæ quam metasternum haud breviora. Type.—*Enamillus Sharpi*, Blackb.

When I attributed this insect to *Enamillus* (Tr.R.S.S.A., 1905, p. 278) I had not seen a typical member of that genus, and therefore mentioned the probability that a new generic name might be required eventually. Having now examined a genuine *Enamillus* I find that my forecast was correct, as will appear from the above diagnosis. The antennæ of this insect (perhaps of the male only) are truly remarkable, and might fitly be characterized as an exaggeration of the antennæ of *Diphyllocera*. Each lamina of the flabellum is fringed with a row of robust elongate filaments or setæ, and each of these filaments is itself clothed with fine erect pilosity. The first lamina is so shaped as to somewhat enfold some of the following laminæ, which was my chief reason for placing the species in *Enamillus* provisionally; but having now examined a true *Enamillus* I am able to say that the enfolding in the present genus is much slighter than in *Enamillus*.

SERICIDES.

Atermonocheila *(gen. nov., Sericidarum)*.

Mentum sat transversum, antice emarginatum; palpi labiales modici, articulo apicali elongato gracili subfiliformi; palpi maxillares sat elongatis sat gracilibus, articulo apicali subcylindrico; labrum haud manifestum; oculi magni minus nitidi subtilissime granulati, antice a cantho profunde incisi; antennæ (speciei typicæ) 9-articulatæ, flabello 3-articulato (laminis maris quam articuli ceteri conjuncti vix brevioribus, pilis brevibus subtilibus erectis vestitis); clypeus antice truncatus; prothorax transversus; elytrorum interstitia alterna angusta lævia, alterna lata haud lævia; pedes graciles; tibiæ anticæ (speciei typicæ) extus bidentatæ, dente tertio supra medium vix manifesto; corpus totum setis brevibus crassis adpressis vestitum; coxæ posticæ perbreves, quam metasternum fere triplo breviores.

This genus must be placed near *Epholcis*, from which it differs by, *inter alia*, its flat transverse mentum, the structure of its labial palpi, its much more elongate legs (with claws elongate, slender, and devoid of quill-like appendages), and its elytra geminate-substriate, after the manner of *Scitala*. A hind tibia with its tarsus is considerably longer than the elytra. It should be added that the term "geminate-substriate" requires qualification in respect of the elytra of the typical species of this genus. The subsutural stria is very distinct, but the alternate interstices on the remaining part of the elytra, while narrow and devoid of sculpture (as in *Scitala*), are not limited by defined striæ. If additional species of this genus are discovered, it is probable that the elytral interstices will be found to be alternately wide with sculpture and narrow without sculpture. But the character of the striation in other respects is probably not generic.

A. longipes, sp. nov., Mas. Ovata; sat nitida; tota setis brevissimis adpressis sat æqualiter minus crebre vestita; opaca; rufo-ferruginea, pedibus rubris; clypeo antice sat reflexo; prothorace quam longiori ut 9 ad $5\frac{1}{2}$ latiori, antice minus angustato, lateribus modice arcuatis, angulis anticis vix acutis parum productis posticis subrotundatis, basi haud marginata utrinque sat fortiter sinuata; scutello sat elongato triangulari; elytris stria subsuturali impressis, interstitiis 4 lævibus ornatis; tarsorum posticorum articulo basali quam 2^{us} sat breviori; segmento ventrali apicali perbrevi, postice haud emarginato. Long., 5 l.; lat. $2\frac{3}{5}$ l.

This being the typical species of the genus, it is unnecessary to repeat, in describing it, the characters already cited in the generic diagnosis. With the exception of the subsutural stria of the elytra the whole dorsal and under-surface of the body is devoid of sculpture other than the remarkably evenly-distributed punctures, in which the setæ are inserted, and which are only visible when the setæ have been removed. The setæ are extremely short, closely adpressed, and somewhat coarse.

Western Australia. Given to me by Mr. Jung.

SERICOIDES.

Caulobius.

C. (Ocnodus) ferrugineus, Blackb. (Tr.R.S.S.A., vol. xvi., p. 28). This species, attributed by me with an expression of much doubt to *Ocnodus*, must be transferred to *Caulobius*. In my tabulation of distinctive characters of the species of *Caulobius* (*loc. cit.*, 1906, p. 288), *C. ferrugineus* falls beside *C. punctulatus*, Blackb., from which it may be distinguished as follows:—

D. Elytral interstices quite strongly convex ... ... punctulatus, *Blackb.*
DD. Elytral interstices not convex ... ferrugineus, *Blackb.*

As the type of this species is unique and belongs to the S.A. Museum, I have not been able to subject it to the manipulation necessary to arrive at certainty as to the number of joints in its antennæ; I am, however, almost sure that they are nine in number.

Haplonycha.

H. Griffithi, sp. nov., Fem. Sat elongata; ovata; subnitida; rufa, elytris antennis palpisque testaceo-brunneis; leviter iridescens; corpore subtus pedibusque longe pilosis; palporum maxillarium articulo 3° quam 2^{us} et quam 4^{us} sat breviori; antennis 9-articulatis, articulo 4° quam 3^{us}

sat breviori; flabello 5-laminato, lamella basali perbrevi ceteris quam articuli 2-5 conjuncti vix brevioribus; clypeo modice elongato, peralte reflexo, subtiliter sat sparsim punctulato; fronte subtiliter obsolete punctulata; prothorace quam longiori duplo latiori, antice modice angustato, supra sparsim subtiliter sat obsolete punctulato, lateribus sat fortiter rotundatis anguste marginatis, basi utrinque parum sinuata, angulis posticis obtusis bene determinatis; elytris leviter geminato-striatis, sparsim sat subtiliter punctulatis; pygidio sparsim obsolete punctulato, longitudinaliter subcarinato; tarsorum posticorum articulo basali 2° longitudine sat æquali. Long., 9 l.; lat., 4$\frac{1}{2}$ l.

This species is readily distinguishable from the other described species of the genus. Its group characters place it in Group V., in which only two iridescent species have been previously described (*gigantea*, Burm., and *lucifera*, Blackb.), from both of which it differs by, *inter alia*, its very much smaller size, the female antennæ terminating in four equal (or nearly so) lamellæ, the forehead scarcely visibly punctulate, etc. It does not fit into my tabulation of *Haplonycha* (Tr.R.S.S.A., 1906, pp. 297, etc.), owing to my having used the word "large" in characterizing the aggregate "A" on p. 301. In order to place it, the following must be substituted for the first nine lines under Group V.:—

A. Iridescent species. [Joint 3 of maxillary palpi conspicuously shorter than joint 2].	
B. Frons conspicuously punctulate.	
C. Pygidium but little nitid, closely sculptured, especially near base	gigantea, *Burm.*(?)
CC. Pygidium brilliantly nitid, its puncturation extremely sparse	lucifera, *Blackb.*
BB. Frons scarcely punctulate ...	Griffithi, *Blackb.*
AA. Non-iridescent species.	

Northern Territory; Port Darwin. Given to me by Mr. H. Griffith.

Petinopus.

I have no further information to be recorded regarding this genus, and have not seen any more examples than those mentioned when I characterized the genus in 1898. The unique species is probably a very rare one.

Glossocheilifer.

Since I described *G. labialis* (Tr.R.S.S.A., 1898, p. 37) I have obtained a male example of a second species of this curious genus, of which the following is a description:—

G. addendus, sp. nov., Mas. Elongato-ovatus; subnitidus; supra fere glaber, corpore subtus pedibusque pilosis; rufo-testaceus, elytris dilutioribus; capite confertim subtilius, pronoto sat crebre sat æqualiter subtiliter, elytris subfortiter sat crebre, pygidio sparsim sat obsolete punctulatis; clypeo antice rotundato minus fortiter reflexo; prothorace postice marginato, antice angustato, sat transverso, lateribus fortiter arcuatis, angulis anticis parum productis subobtusis posticis rotundatis, basi utrinque subsinuata; elytris in disco sat (latera versus vix) manifeste striatis, striis geminatis; tarsorum posticorum articulo basali quam 2us sat breviori. Long., $7\frac{1}{2}$ l.; lat., $3\frac{4}{5}$ l.

Australia; exact locality doubtful, probably Western Australia.

Apart from colour, this species differs from *G. labialis*, Blackb., by, *inter alia*, the closer discal puncturation of its pronotum, the blunter and less prominent front angles of its prothorax, and the notably stronger and closer punctuation of its elytra. The joints of the flabellum of its antennæ are not quite so long as the preceding joints of the antennæ together. The hind coxæ are very evidently, but not very much, shorter than the metasternum; in *G. labialis* they are a little shorter than in this species.

Scitala.

The positive identification of species described by the older authors in this genus is practically impossible without examination of types which are scattered through European collections, and some of which have probably perished. There is no other alternative than either to leave the genus as constituting an insoluble enigma or to deal with it, using one's best judgment in making probable identifications, and produce a monograph of its species, which is sure to contain many errors, but which will at any rate, I hope, prove to be intelligible and, therefore, capable of correction. At present there is comparatively little which can be affirmed either to be correct or to be incorrect, as a large number of the descriptions of species are incapable of identification with any insect in particular, and therefore I adopt the latter of the expedients mentioned above. If I can, with the aid of some knowledge of localities in which species occur, arrive at the probability of the insects on which the descriptions were founded and claim some at least of the old names for species which my notes may render identifiable, it will be possible for workers who may have access to such of the widely-scattered types as still remain to confirm or correct my identifications.

It is extremely difficult to compile a satisfactory list of the names that can correctly be said to have been applied to insects that have been or at the time of description might have been with fairly good reason regarded as members of this genus. I have already discussed at some length (P.L.S.N.S.W., 1890, pp. 539, etc., and Tr.R.S.S.A., 1898, pp. 37, etc.) the highly intricate question of the generic validity of the names *Scitala* and *Sericesthis*, and I will not now repeat the discussion but merely mention the conclusion I arrived at and to which I still adhere, viz., that they are both valid names, *geminata*, Boisd. (which is the type of *Sericesthis*, and is generally accepted as a later name for *Melolontha pruinosa*, Dalm.) being generically distinct from the species for which Erickson founded the genus *Scitala*. Other species to which other generic names (*Melolontha*, *Cotidia*, and *Anodontonyx*) have been applied by their authors have been by some authors attributed to *Scitala*. As indicated below, *Cotidia* is probably synonymic with *Heteronyx*. *Anodontonyx* may rightly be treated as a valid genus. Of course none of the species in question are true members of the genus *Melolontha*. The name *Scitala*, then, must, in my judgment, be restricted (among the Australian *Sericoides*) to species possessing the following characters: Prosternal sutures normal, claws simple, membranous wings fully developed, femora not exceptionally elongate and slender, elytra normally elongate, eyes large convex and scarcely granulate, front tibiæ and antennal flabellum not of extraordinary structure, tarsi not bearing tufts of long soft hairs, labrum distinct from the vertical front face of the clypeus,(1) front of clypeus neither emarginate nor with acute lateral angles, base of pronotum completely margined, elytra geminate-striate, hind tibiæ fairly elongate and not very strongly dilated at apex, sterna more or less subglabrous (never closely pilose), flabellum of antennæ not in both sexes very (and subequally) short. The genus *Scitala* is in the extraordinary position of having been founded by Erickson for two species neither of which agrees in all respects with the generic diagnosis. I see no escape from this conclusion, since it appears impossible to doubt that two common Tasmanian insects which agree perfectly as species with the well-expressed descriptions of their author are really the two for which he proposed the name *Scitala*. Moreover, I had the opportunity some years ago of examining specimens which Professor Kolbe of Berlin lent me for inspection as the types of Erickson's species, and I found them to be identical with the species to which I had attributed the names. Erickson says that the

(1) *Scitala pallidula*, Macl., presents the only exception known to me in respect of this character.

antennæ of *Scitala* are eight-jointed and that the flabellum of the male antennæ is more than twice as long as that of the female antennæ. As a fact, the antennæ of *S. sericans* differ from the above description in being nine-jointed, and those of *S. languida* in the flabellum being subequal in the two sexes. I can only suppose that Erickson had of *languida* only the female before him and counted the joints in its antennæ and assumed that the unseen male would differ from its female as male *sericans* differs from its female; and that he then assumed (without counting) that the antennæ of *sericans* had the same number of antennal joints as the species which he regarded as congeneric with it. As *sericans* stands before *languida* in Erickson's memoir—and as the variation of its antennæ from the generic diagnosis is only in respect of a character *(i.e.*, number of joints) which is certainly not generic in the Australian *Sericoides* while the variation of *languida* is in respect of a much more important character *(i.e.*, the sexual structure)—the right course appears to be to amend Erickson's diagnosis by taking out from it "8-articulatæ," and then regard *sericans* as the typical species. Burmeister, indeed, has already altered the generic diagnosis to make it include species with nine-jointed antennæ but without noticing that the antennæ of *sericans* are nine-jointed.

Erickson's generic diagnosis, moreover, is incorrect in its statement that the basal joint of the hind tarsi is shorter than the second joint. This is true of *languida* (more decidedly in the female than in the male), but in the male of *sericans* the basal joint is notably longer than the second. Burmeister reproduces this error in respect of the species (evidently having seen only females), but does not treat it as a generic character. Neither of those authors seems to have observed that the length of the basal joint of the hind tarsi varies sexually. Burmeister indicates that he has not seen the male of *languida*, but nevertheless asserts (probably quoting from Erickson) that the flabellum of its antennæ is very elongate. As a fact it is (as stated above) very short, and the species must be transferred to the genus *Anodontonyx*. There is no definite assertion on the part of either author that he has seen the male of *languida*.

The number of names that have been applied to species under the name *Scitala* or under names that may reasonably be (or at any rate have been) considered equivalent to *Scitala* as that name has been at some time or other understood, is twenty-nine. As I consider that only nine of those names can stand as representing valid species (capable of identification) of the genus *Scitala* in the strict sense, it seems necessary to furnish notes on the names that I reject, as follows:—

Scitala ænescens, Burm. There is nothing in the description of this species that indicates distinction from a darkly-coloured specimen of *S. sericans*, Er., which varies extremely in colouring.

Scitala armaticeps, Macl. I have examined the type of this insect in the Australian museum and find that it is a *Neso*, and differs from all the other described species of that genus by, *inter alia*, the remarkable elevated transverse carina that crosses its clypeus a little in front of the clypeal suture.

Cotidia australis, Boisd. This name stands in Masters' Catalogue as a synonym of *Sericesthis (Scitala) pruinosa*, Dalm., but that reference is certainly incorrect, as Boisduval says, "subtus pilis fulvis hirsuta." There is in the Macleay Museum a specimen ticketed in Mr. W. S. Macleay's writing, "Cotidia australis, Gory"—the name followed by an obscure mark (in very much-faded ink) which I think has been a note of interrogation. Unless the actual type can be referred to, this Sydney specimen is probably the most authentic in existence, and it seems to agree fairly with Boisduval's pseudo-description. It is a *Heteronyx*, and therefore need not be further discussed here.

Melolontha chlorotica, Gyll. A label in the handwriting of Mr. W. S. Macleay, bearing the words "Ectoma chlorotica, Sch.," is attached to a specimen in the Macleay Museum. Probably this specimen is a co-type, if not the actual type. As it is a *Heteronyx* I need not discuss it further here.

Sericesthis geminata, Boisd. Described in six words. Burmeister makes it identical with *Sericesthis pruinosa*, Dalm., which is not a true *Scitala*. No guess, even at its genus, can be made from the description.

Melolontha ciliata, Boisd. Referred by Burmeister and Blanchard to *Haplonycha*, and reported by me under heading of that genus as incapable of identification. The Macleay Museum possesses a specimen ticketed in Mr. W. S. Macleay's writing "Sericesthis ciliata, McLeay." It is almost certainly a co-type. Being a *Heteronyx* its further discussion will stand over to the next paper of this series.

Sericesthis glabra, Blanch. Probably *Scitala* or *Anodontonyx*, but the description does not mention the structure of the antennæ, and such as it is would apply to several species of either genus.

Scitala impressa, Brenske. This is probably a later name for *Neso (Scitala) armaticeps*, Macl. The type of *armaticeps* agrees well with Brenske's description.

Scitala languida, Er. = *Anodontonyx*.

Sericesthis micans, Blackb. = *Anodontonyx*.

Sericesthis nigrolineata, Boisd. = *Anodontonyx*.

Scitala pallidula, Macl. I have examined the type specimen in the Macleay Museum. Unfortunately there is no means of determining its sex. It seems to be a typical *Scitala* (the unusual shape of the clypeus being disregarded) if it be a female; but if it is a male the short laminæ (three in number) of the antennal flabellum, together with the peculiar clypeus may justify Macleay's suggestion that it "should perhaps form a new genus." Its place in my tabulation (*infra*) indicates its principal characters. The exceptional shape of its clypeus makes it stand in *Byrrhomorpha* in my tabulation of *Sericoid* genera (Tr.R.S.S.A., 1898, pp. 32, etc.). *Vide infra*, under heading *Byrrhomorpha*.

Sericesthis parvipes, Blackb. = *Anodontonyx*.

Sericesthis planiceps, Blackb. = *Anodontonyx*.

Sericesthis pruinosa, Dalm. The type of *Sericesthis*, as distinguished from *Scitala*.

Sericesthis pruinosa, Blanch. *Nom præocc.* = *Scitala rugosula*, Har.

Scitala pruinosella, Brenske = *Sericesthis*.

Sericesthis pullata, Boisd. Described in seven words. Quite unrecognizable. "*Elytris subtomentosis*" seems inconsistent with its being a true *Scitala*.

Scitala rugosula, Har. = *Anodontonyx*.

Scitala suturalis, Macl. = *Sericesthis*, as distinct from *Scitala*. I have examined the type.

Sericesthis cervina, Boisd. In the Macleay Museum is a specimen bearing a label on which Mr. W. S. Macleay wrote "Sericesthis cervina, Dej. N.S.W." As it is probable that the specimen is a co-type, and as it agrees with Boisduval's pseudo-description, there can be little doubt that it is the genuine thing. In former memoirs I have expressed the opinion that *S. cervina*, Boisd. could not be determined without inspection of the type. As the specimen in the Macleay Museum is a *Heteronyx* I need not discuss it further here, but shall hope to do so in the next of this series of papers.

To the nine species which I regard as at present constituting the genus *Scitala* I have now to add ten new species. The following is a tabular statement of the characters by which the species of *Scitala* can be distinguished *inter se*.

A. Antennæ consisting of only 8 joints.
  B. Hind angles of pronotum conspicuously explanate and upturned ... rugosiceps, *Blanch.(?)*
  BB. Hind angles of pronotum not as "B."
    C. Forehead non-rugulose and not nearly confluently punctured.
      D. Pronotum extremely convex longitudinally (*i.e.*, viewed from the side) ... ... convexicollis, *Blackb.*

DD. Pronotum normal.
E. Dorsal surface non-iridescent ... parallela, *Blackb.*
EE. Dorsal surface iridescent.
F. Pygidium less finely punctulate (almost as *S. sericans*, Er.) ... ... Ino, *Blackb.*
FF. Pygidium notably more finely punctulate ... nemoralis, *Blackb.*
CC. Forehead confluently (at any rate on sides), and more or less rugulosely, punctulate.
D. Pronotum not or but little rugulose.
E. Raised edging of pronotum considerably thickened and more elevated round hind angles ... ... dispar, *Blackb.*
EE. Raised edging of pronotum not thickened nor more elevated round hind angles ... puncticollis, *Blackb.*
DD. Pronotum closely and very strongly scabrous ... ... erosa, *Blackb.*
AA. Antennæ consisting of 9 joints.
B. Clypeus and forehead divided from each other by a deep furrow.
C. Lateral edging of pronotum notably more raised in front than in middle, with lateral gutter much dilated in front.
D. Raised edging of base of pronotum notably more elevated at the ends than in the middle ... ... Nemesis, *Blackb.*
DD. Raised edging of base of pronotum continuously fine.
E. Sides of prothorax normally arched (almost as in *Sericesthis pruinosa*, Dalm.) ... rorida, *Burm. (?)*
EE. Sides of prothorax much less strongly arched.
F. Pygidium non-carinate; size large (more than 7 l.) hospes, *Blackb.*
FF. Pygidium longitudinally carinate (feebly in male, strongly in female); size small (about 5 l.) ... calescens, *Blackb.*
CC. Lateral edging of pronotum even, or all but even.
D. Raised edging of pronotum obsolete in middle of base.
E. Elytral puncturation subrugulose; colour black or piceous above, dark piceous beneath.
F. Pygidium closely but not confluently punctulate ... ambigua, *Blackb.*
FF. Pygidium confluently rugulose ... ... coxalis, *Blackb.*

EE. Elytral puncturation non-rugulose; colour chestnut, with golden gloss	aureo-rufa, *Blanch.(?)*
DD. Raised edging of pronotum continuous across base.	
E. Front of clypeus gently emarginate	pallidula, *Macl.*
EE. Front of clypeus widely rounded.	
F. Joints of flabellum of male antennæ very much longer than joints 1-6 of antennæ tobether; head bicolorous	sericans, *Er.*
FF. Joints of flabellum of male antennæ scarcely longer than joints 1-6 of antennæ together; head unicolorous	subsericans, *Blackb.*
BB. Head continuously convex; clypeus separated from forehead only by a suture (at any rate in male) ...	juvenis, *Blackb.*

It seems well to preface my descriptions of new species with a note on the vestiture of the under surface. In the case of some species I have described the sterna as "sparsim pilosa," and have omitted mention of pilosity in describing others, calling them "subglabra." I do not attach much importance to this character. The vestiture of the sterna is easily rubbed off, and I am disposed to think that there is more or less pilosity (never close and conspicuous as it is in *Haplonycha)* on the sterna of fresh specimens of all *Scitalæ*. In dealing with single specimens, the describer, however, can record only pilosity which is present, and of course specimens must in some instances be described which are not in perfectly fresh condition.

S. rugosiceps, Blanch. My identification of this species is somewhat of the nature of a guess, as there is nothing in the description inconsistent with its being any one of rather numerous species. The probability, however, seems to be slightly in favour of *rugosiceps* having eight-jointed antennæ (though without any definite statement to that effect). If that be the case, the insect to which I apply the name is the only one known to me that size locality and colour in combination would indicate as likely to be *rugosiceps*. I suspect that this insect is also the original of Burmeister's description of *S. sericans*, Er. (though it is certainly not that species—*inter alia* because of its strongly punctulate scutellum), chiefly on account of its being, among the possible species known to me, that which agrees best with Burmeister's statement that the tarsi of *S. sericans* are devoid of setæ, the setæ of its tarsi being very inconspicuous and on the *hind* tarsi almost wanting. (For the identification of the true *S. sericans*, Er., see my remarks above).

S. convexicolliis, sp. nov., Mas (?). Ovata; sat convexa; nitida; subglabra; dilute brunnea, leviter aureo-micans, prothorace pedibusque rufescentibus; antennis 8-articulatis, flabello quam articuli 2-5 conjuncti vix longiori; palporum maxillarium articulo apicali ovali; clypeo confertim punctulato, antice sat fortiter reflexo-subtruncato; fronte sat plana sparsius punctulata transversim impressa; prothorace sat fortiter (fere ut 9 ad $5\frac{1}{2}$) transverso, fortiter gibbo, antice minus angustato, supra sparsius minus subtiliter punctulato, angulis anticis sat acutis posticis rotundato-obtusis haud explanatis, basi late rotundata; scutello punctulato; elytris leviter geminato-striatis, fere ut pronotum sed paullo magis crebre punctulatis; pygidio subplano sparsius subtiliter punctulato; segmentis ventralibus (lateribus exceptis) vix perspicue punctulatis, ultimo medio breviter lobato-producto; tibiis anticis extus 3-dentatis; tarsis posticis (exempli typici) subtus sparsissime setosis, articulo basali quam 2us sat breviori; coxis posticis quam metasternum quinta hujus parte brevioribus. Long. 5 l.; lat. $2\frac{3}{5}$ l.

Its strongly gibbous pronotum distinguishes this species readily from all others (known to me) to which it bears much superficial resemblance. From its ventral characters I think it must be a male, but the structure of its antennæ and hind tarsi is more suggestive of a female. The sexual characters and small size cause it to form (together with *S. nemoralis*, Blackb. and probably *Ino*, Blackb.) a distinct group in *Scitala* which may possibly be eventually regarded as another genus.

N. S. Wales. I have no record of the exact locality in which I captured it.

S. nemoralis, sp. nov. Mas. (?). Subelongata, leviter ovata; sat convexa; subnitida; subglabra; testaceo-brunnea, leviter iridescens, capite prothorace sternis pedibusque magis rufescentibus; antennis 8-articulatis, flabello quam articuli 2-5 conjuncti subbreviori; palporum maxillarium articulo apicali elongato-subcylindrico; clypeo confertim punctulato, antice vix subtruncato, modice reflexo; fronte sparsius subtilius punctulata, sat convexa; prothorace sat fortiter (ut 9 ad 5) transverso, antice minus angustato, supra subtilius crebrius punctulato, angulis anticis sat acutis posticis rotundato-obtusis haud explanatis, basi late leviter rotundata; scutello punctulato; elytris sat fortiter geminato-striatis, quam pronotum paullo magis crebre magis fortiter punctulatis; pygidio sat convexo, crebre sat subtiliter punctulato, antice obtuse longitudinaliter carinato; segmentis ventralibus sat obsolete punctulatis, ultimo medio breviter lobato-producto; tibiis anticis extus 3-dentatis; tarsis posticis (exempli typici) subtus minus sparsim setosis, articulo basali quam 2us sat breviori; coxis posticis quam metasternum quinta hujus parte brevioribus. Long., 5 l.; lat., $2\frac{1}{2}$ l.

Near *S. convexicollis*, Blackb., and no doubt the same sex as the type of that species, since the apical projection of the last ventral segment is almost sure to be sexual; at the same time the much greater convexity of the pygidium in this species is suggestive of sexual difference. This species differs from *S. convexicollis* in many respects besides that of its pronotum being of normal convexity; *inter alia*, the apical joint of its maxillary palpi is more slender and elongate, the puncturation of all parts of its dorsal surface except the pygidium is much finer; that of its pronotum is evidently—and of its elytra considerably—closer; its clypeus is more rounded in front; the basal part of its pygidium is carinate; its surface is very evidently iridescent, and its tarsi are evidently more setose beneath.

New South Wales: I have unfortunately no record of the exact locality. This and the preceding species are both, I believe, from localities at no great distance from Narrabri, or at any rate in that direction, where I collected some *Scitalæ*.

S. Ino, sp. nov. Fem. Ovata; convexa; subnitida; subglabra; rufo-brunnea, iridescens; antennis 8-articulatis, flabello quam articuli 2-5 conjuncti vix longiori; palpis (exempli typici) carentibus; clypeo crebre punctulato, antice rotundato modice reflexo; fronte sparsim minus subtiliter punctulata, sat convexa; prothorace sat fortiter (ut 9 ad 5) transverso, antice minus angustato, supra sparsius minus subtiliter punctulato, angulis anticis sat acutis posticis obtusis (vix rotundatim) haud explanatis; basi late vix sinuatim rotundata; scutello punctulato; elytris sat fortiter geminato-striatis, fere ut pronotum punctulatis; pygidio sat fortiter convexo crebrius minus subtiliter punctulato; segmentis ventralibus sat obsolete punctulatis, ultimo late subtruncatim rotundato; tibiis anticis (exempli typici) extus obtuse subobsolete 3-dentatis; tarsis posticis (exempli typici) carentibus; coxis posticis quam metasternum quinta hujus parte brevioribus. Long., 5 l.; lat., $2\frac{2}{5}$ l.

The specimen here described is unfortunately not in good condition, but as it is the only female that I have seen which can be grouped with the preceding two species it seems desirable to place its characters on record. Its sexual differences seem to consist chiefly in the evenly-rounded front margin of the clypeus, its antennal flabellum a little abbreviated, its ventral segments more massive and convex, and the hind margin of the apical ventral segment not produced in the middle. The obsolete sinuation of the external margin of the front tibiæ is probably due to some accidental cause. As a species it differs from *convexicollis* by its non-gibbose pronotum, its iridescent dorsal surface, much more conspicuously geminate striate elytra, etc., and from *nemoralis* by, *inter alia*, the notably stronger and less close puncturation of its frons pronotum and elytra. This species and the preceding two are very unsatisfactorily intermediate between *Scitala* and *Anodontonyx*, and bear much superficial resemblance to some species of the latter. They differ from both in the nature of their ventral sexual characters, from typical *Scitalæ* by the feebleness of the sexual characters of the antennæ, and from *Anodontonyx* by the flabellum of the antennæ being very evidently longer in both sexes.

Queensland; Brisbane (Mr. F. M. Bailey).

S. Nemesis, sp. nov. Ovata, sat elongata; sat convexa; minus nitida; subglabra, sternis femoribusque sparsim pilosis; testaceo-brunnea, nonnihil iridescens; antennis 9-articulatis; clypeo confertim rugulosius punctulato, antice rotundato, sat fortiter reflexo; fronte sat convexa, sat crebre minus subtiliter punctulata; prothorace quam longiori ut 7 ad 4 latiori, antice minus fortiter angustato, supra minus crebre minus subtiliter punctulato, lateribus sat arcuatis, margine laterali antice quam in parte mediana multo magis elevata, angulis anticis acutis posticis haud explanatis rotundato-obtusis, basi utrinque sat fortiter sinuata, margine basali angulos versus quam in parte mediana sat multo magis elevato; scutello vix punctulato; elytris sat fortiter geminato-striatis, sat fortiter sat crebre sat rugulose punctulatis; pygidio sat convexo, minus crebre minus subtiliter punctulato; segmentis ventralibus obsoletius punctulatis; tibiis anticis extus 3-dentatis; tarsis posticis subtus seriatim sat crebre setulosis, articulo basali quam 2^{us} paulo longiori.

Maris antennarum flabello quam articuli 1-6 conjuncti paullo longiori, feminæ articulis 2-6 conjunctis sat æquali; segmento apicali ventrali postice maris late elevato et emarginato; feminæ truncato minus fortiter elevato. Long. 7-8 l.; lat. $3\frac{1}{5}$-$3\frac{3}{5}$ l.

A typical *Scitala*; distinct from all others known to me with nine-jointed antennæ by the raised lateral edging of its protonotum being on the sides much more elevated in front than in the middle and on the base very evidently more elevated at the ends than in the middle. I have a female example of *Scitala* taken in South Australia which may represent a distinct species, but does not seem to differ from the female described above, except in the considerably closer puncturation of its pygidium.

South Australia; Fowler's Bay. Also from Western Australia.

S. rorida, Burm. This is one of the most difficult of identification among the *Scitalæ*. The description (colour and size being disregarded) will fit almost any member of the genus having 9-jointed antennæ. And, unfortunately, there is no indication—beyond the mention of Australia—of the locality in which this species occurs, unless a guess can be made from the mention of Mr. Melly as the donor of the type. Glancing through Burmeister's descriptions of Australian species, it is noticeable that most of those to which Mr. Melly's name is attached relate to insects that are found in New South Wales, and therefore the probabilities are in favour of the type of *rorida* having come from that State. I therefore select among the *Scitala* known to me from New South Wales that which best agrees in respect of size and colour with Burmeister's description, and apportion the name to a species that I met with in the Blue Mountains. It is a large dark-coloured insect with bright iridescence, its entire dorsal surface being of about the same colouring as the head and pronotum of *Sericesthis pruinosa*, Dalm., and on referring to Burmeister's descriptions of the two species I find that he uses exactly the same expression to characterize the dorsal surface of *rorida* and the head and pronotum of *pruinosa*—"*dunkelbraun lebhaft irisirend.*" The probability, therefore, seems to be in favour of the correctness of my identification. It should be noted, however, that the species appears to be very variable in colour (some specimens otherwise indistinguishable being of a pale iridescent brown tint) and widely distributed, since I have taken in the neighbourhood of Adelaide examples that seem quite identical with those taken near Sydney.

S. hospes, sp. nov. Sat late ovata; modice convexa; minus nitida; subglabra, sternis femoribusque sat sparsim pilosis; testaceo-brunnea, nonnihil aureo-micans, leviter iridescens; antennis 9-articulatis; clypeo confluenter ruguloso, antice late rotundato, modice reflexo; fronte sat convexa, antice crebre ruguloso postice gradatim minus crebre nec rugulose punctulata; prothorace quam longiori fere ut 7 ad 4 latiori, antice sat fortiter angustato, supra minus crebre minus subtiliter subinæqualiter punctulato, lateribus parum arcuatis, margine laterali antice quam in parte mediana multo magis elevata, angulis anticis acutis posticis haud explanatis obtusis haud rotundatis, basi utrinque manifeste sinuata, margine basali æquali; scutello haud punctulato; elytris geminato-striatis (maris exempli typici parum fortiter), crebre sat fortiter minus rugulose punctulatis; pygidio fere ut pronotum punctulato; segmentis ventralibus obsoletius punctulatis; tibiis anticis extus 3-dentatis; tarsis posticis subtus seriatim setulosis, articulis basalibus 2 inter se sat æqualibus. Maris antennarum flabello quam articuli 1-6 conjuncti paullo longiori, feminæ articulis 2-6 conjunctis sat æquali; maris segmento apicali ventrali postice leviter elevato et emarginato, feminæ truncato vix elevato; maris quam feminæ pygidio multo magis convexo. Long. $7\frac{1}{2}$-8 l.; lat. $3\frac{4}{5}$-$4\frac{1}{5}$ l.

Closely allied to *S. rorida*, Burm. (?); possibly an Alpine race of that species. It is of more robust build and much less iridescent, with the sides of the prothorax very manifestly less rounded and more sinuate behind the middle (in both species there is more or less tendency to sinuosity, more apparent from some than from other points of view). The geminate-striation of the elytra is feebler, and their punctuation closer than in *rorida* (?). This form, even if not a valid species, is at any rate a very clearly distinguishable race-type. The specimens before me do not vary in colouring.

Victorian Alps; near a place called "The Hospice," 6,000 feet above the sea.

S. calescens, sp. nov. Sat elongata, parum ovata; sat convexa; subnitida; subglabra; brunneo-testacea, fronte picea; leviter iridescens; antennis 9-articulatis; clypeo crebre vix rugulose punctulato, antice late leviter subtruncato sat fortiter reflexo; fronte subfortiter vix crebre punctulata, sat convexa; prothorace quam longiori fere ut 7 ad 4 latiori, antice minus angustato, supra sat fortiter vix crebre punctulato, lateribus bisinuatis, margine laterali antice quam in parte mediana sat multo magis elevato, angulis anticis acutis posticis haud vel vix explanatis acute rectis, basi utrinque parum sinuata, margine basali angulos versus quam in parte mediana perspicue magis elevato; scutello vix manifeste (vel potius subtilissime) punctulato; elytris minus fortiter geminato-striatis sat fortiter minus crebre punctulatis; pygidio basin versus minus subtiliter nec crebre punctulato apicem versus crebre subtilius transversim ruguloso, longitudinaliter breviter plus minusve fortiter carinato; tibiis anticis extus 3-dentatis; tarsis posticis subtus seriatim setulosis, articulo basali quam 2us breviori.

Maris antennarum flabello quam articuli 1-6 conjuncti paullo longiori, feminæ articulis 2-6 conjunctis sat æquali; maris quam feminæ tarsis manifeste longioribus; maris carina pygidiali parum perspicua in longitudinis medio sita, feminæ bene elevata basali; maris segmento ventrali apicali postice minus late emarginato et minus elevato, feminæ late subtruncato manifeste elevato. Long., 5-5$\frac{3}{5}$ l.; lat., 2$\frac{1}{5}$-2$\frac{4}{5}$ l.

The sexual characters in this species are unusually well marked and numerous. The lateral outline of its prothorax resembles that of *S. hospes*, Blackb. Its small size distinguishes it from its near allies. The basal joint of its hind tarsi, notably shorter in both sexes than the second joint, is also very distinctive; also the hind angles of its prothorax (viewed from above), sharply rectangular or even subacute. The hind coxæ are evidently, but not much, shorter than the metasternum.

North Queensland (Mr. R. C. L. Perkins).

S. ambigua, sp. nov. Ovata; convexa; robusta; minus nitida; subglabra; picea vel rufo-picea, pruinosa vix iridescens; antennis 9-articulatis; clypeo sat nitido, crebre leviter ruguloso, in medio sat gibbo, antice rotundato fortiter reflexo; fronte subtiliter minus crebre punctulata, modice convexa; prothorace quam longiori ut 7 ad 4 latiori, antice sat angustato, supra sat subtiliter sat crebre subobsolete punctulato, lateribus parum arcuatis, margine laterali sat æqualiter elevato sed sulco submarginali antice nonnihil dilatato, angulis anticis acutis posticis leviter obtusis vel obtuse rectis haud explanatis, basi utrinque sinuata, margine basali in medio obsoleto; scutello punctulato; elytris minus fortiter geminato-striatis, sat crebre minus profunde nec subtiliter punctulatis; coxis posticis quam metasternum parum brevioribus; pygidio crebre parum rugulose nec subtiliter punctulato sat convexo; tibiis anticis extus 3-dentatis; tarsis posticis subtus seriatim setulosis, articulo basali quam 2us sat longiori.

Maris antennarum flabello articulis 1-6 conjunctis sat æqualibus feminæ quam articuli 2-6 conjuncti vix longiori; maris quam feminæ tarsis posticis paullo longioribus; maris segmento ventrali apicali postice emarginato et elevato, feminæ subsinuatim truncato nec elevato. Long. 7-8$\frac{1}{4}$ l.; lat. 3$\frac{3}{8}$-4 l.

This species bears some resemblance to *S. sericans*, Er., but *inter alia* is considerably larger, with the basal edging of the pronotum obsolete in the middle of the base, and the antennal flabellum of the male very much shorter and not curved. The present species differs also from *S. ænescens*, Burm., which, however, is very likely to be identical with *sericans*, Er.) by the flabellum of the male antennæ not being arched, as well as by its considerably larger size.

New South Wales; Sydney, etc. In my collection; also from Messrs. Sloane and Lea.

S. coxalis, sp. nov. Mas. (?). Ovata; convexa; robusta; minus nitida; subglabra, sternis femoribusque sparsim pilosis; supra brunneo-rubra nonnihil velutina pruinosa parum iridescens, subtus fere sanguinea, antennis palpisque pallide testaceis; antennis 9-articulatis, flabello quam articuli 1-6 conjuncti manifeste breviori; capite ut *S. ambiguæ*, Blackb.; prothorace quam longiori duplo latiori, antice sat angustato, supra sat crebre sat leviter minus subtiliter punctulato, lateribus leviter arcuatis, margine laterali sat æqualiter elevato, angulis anticis sat acutis posticis (superne visis) acute rectis haud explanatis, basi utrinque sinuata, margine basali in medio obsoleto; scutello punctulato; elytris minus fortiter geminato-striatis, sat fortiter sat crebre punctulatis; pygidio sat gibbo, confertim subgrosse ruguloso; tibiis anticis extus tridentatis; tarsis posticis subtus seriatim setulosis, articulo basali quam 2us sat longiori; coxis posticis quam metasternum haud brevioribus; segmento ventrali apicali postice leviter emarginato leviter elevato. Long. 7 l.; lat. $3\frac{3}{5}$ l.

The unique specimen described above is unsatisfactorily close to the preceding *(S. ambigua)*, but differs in a manner that will not allow it to be regarded as a mere variety. Its pygidium (strongly, very closely, and almost coarsely rugulose, and also strongly gibbous) is quite distinct from that of either sex of *S. ambigua;* its prothorax, moreover, is very manifestly more strongly transverse, and has sharper hind angles. The velvety appearance of its dorsal surface is very likely to be due to the fresh condition of the specimen when killed. The antero-lateral parts of the metasternum are confluently rugulose (in *ambigua* punctured—by no means confluently). The unique type, in spite of its short antennal flabellum, must be considered a male on account of its gibbous pygidium and quite strongly emarginate apical ventral segment.

New South Wales; probably from Mulwala (Mr. Sloane).

S. aureorufa, Blanch. There is very little in the description of this species to indicate any characters that are of specific value; no mention, for instance, of the structure of the antennæ. At the time Blanchard wrote his description "antennæ consisting of eight joints" stood as a generic character of *Scitala*, and therefore it might be argued that its reference to that genus implied that its antennæ have only eight joints. I know no *Scitala* with eight-jointed antennæ likely (from colouring and habitat) to be this species, but I have before me two males and a female of a *Scitala* with nine-jointed antennæ from New South Wales (probably Blanchard's locality), agreeing in size and colouring with the description, and not departing from the description in respect of the few other characters mentioned. My identification of this insect is probably correct. Its distinctive structural characters are indicated in the preceding tabulation, and I may here add the information that in the male the antennal flabellum is slightly bent and slightly longer than the preceding six joints together, the apical ventral segment is only moderately emarginate and feebly elevated behind, and the pygidium strongly convex; while in the female the antennal flabellum scarcely exceeds in length joints 2-6 together, the apical ventral segment is widely subtruncate behind, and the pygidium is only feebly convex. In both sexes the tarsi are sparingly seriate-setulose beneath and (in the male even more than the female) the basal joint of the hind tarsi is notably longer than the second joint.

S. sericans, Er. I have already discussed my identification of this species *(vide supra)*, and have indicated some of its distinctive characters in the preceding tabulation. I will now add the following remarks:—I have examined a long series of specimens from Tasmania, Victoria, South Australia, and New South Wales; the species varies considerably in colouring, Erickson's description of it and Burmeister's description of his *S. ænescens* (which, as already remarked, may well be a variety of it) representing about the two extremes in this respect; in all the specimens that I have seen the forehead is conspicuously and abruptly of dark colour in contrast with the clypeus (this is noted by Erickson, but not by Burmeister); the elytra are not at all rugulose and (for a *Scitala)* are lightly and sparsely punctulate; the flabellum of the male antennæ is notably arched and very elongate, not surpassed in length by that of any *Scitala* known to me; the apical ventral segment of the male is feebly emarginate and feebly elevated behind (that of the female widely truncate and scarcely elevated); the pygidium is moderately convex, slightly more so in the male than in the female; the tarsi are seriate-setulose beneath; the basal joint of the hind tarsi is evidently or scarcely longer than the second joint; the hind coxæ are quite evidently, but not very much, shorter than the metasternum. The variation in the relative lengths of the basal two joints of the hind tarsi is not only sexual, and possibly points to there being more than one species among the specimens before me, but I can find no other character by which to divide them.

S. subsericans, sp. nov., Mas. *S. sericanti*, Er. affinis; magis convexa; capite unicolori rufo; antennarum flabello recto quam articuli 1-6 conjuncti subbreviori; elytris subrugulose magis crebre magis fortiter punctulatis; tarsorum posticorum articulo basali quam 2^{us} sat multo longiori; cetera ut *S. sericans*, Er. Long. $6\frac{1}{4}$ l.; lat. $3\frac{1}{5}$ l.

The structure of the apical ventral segment is conclusive in determining the specimen before me to be a male, but the straight and very short flabellum of its antennæ separates it strongly from the species discussed above as *S. sericans*, in which the female flabellum is not much (though quite decidedly) shorter than that of the present insect. The general resemblance between the two is so close that it seems unnecessary to describe this insect at full length; in all respects not specified in the above Latin diagnosis it agrees with particulars given above as characterizing *S. sericans*.

New South Wales (Mr. Sloane; probably from Mulwala).

S. juvenis, sp. nov., Mas. Ovata; minus convexa; minus nitida; subglabra, sternis femoribusque sparsim pilosis; nigra, sat læte iridescens, elytris abdomine tibiisque picescentibus, antennis palpis tarsisque rufis; antennis 9-articulatis, articulo 6° perminuto, flabello quam articuli 1-6 conjuncti paullo longiori; capite sat æquali, crebre (postice paullo minus crebre) subtilius sat æqualiter punctulato, clypeo antice late rotundato sat reflexo; prothorace quam longiori ut 7 ad 4 latiori, antice modice angustato, supra fere ut clypeus (in medio nonnihil magis grosse) punctulato, sat convexo, lateribus sat rotundatis, margine laterali antice quam in parte mediana magis elevata, angulis anticis parum productis vix acutis posticis (superne visis) rectis haud explanatis, basi utrinque sinuata, margine basali in medio subobsoleto; scutello punctulato; elytris fortiter geminato-striatis, sat fortiter minus crebre punctulatis; pygidio sat convexo, sat crebre sat fortiter punctulato; tibiis anticis extus tridentatis; tarsis posticis (exempli typici) carentibus; coxis posticis quam metasternum multo brevioribus; segmento ventrali apicali postice late emarginato leviter elevato. Long. 4 l.; lat. 2 l.

An extremely isolated species in *Scitala*, but I can find no character on which to found generic distinction, unless it be the peculiar form of the dorsal surface of the head in which the clypeus and forehead are scarcely distinguishable *inter se*, except by a fine (though well-marked) suture, and that does not appear sufficient. Its superficial resemblance is to *Platydesmus*, but *inter alia* its geminate-striate elytra are inconsistent with a place in that genus. The sixth joint of the antennæ is extremely minute, and without careful examination the antennæ appear to have only eight joints.

Victoria (Mr. Kershaw).

Anodontonyx.

This genus was characterized by Dr. Sharp in 1890 in an American publication, "Insect Life" (vol. ii. p. 302). In the same year I described (P.L.S., N.S.W., pp. 546, etc.), under the generic name *Sericesthis*, three species which seem to be members of Dr. Sharp's genus. I attributed them to *Sericesthis* on the assumption that Lacordaire, Burmeister, etc., were right in regarding the typical species of *Scitala* and *Sericesthis* as congeneric, *Sericesthis* being the earlier name of the two. Subsequent study has led me to the conclusion that the two names are both of generic value, and had I made that discovery at the time I described the species in question I should have attributed them to *Scitala;* I failed to do so only because the distinctness of the two genera had up to that time escaped notice, and I regarded *Scitala* as a mere synonym of *Sericesthis*, as I explained fully at the time (loc. cit.). *Anodontonyx* is very close to *Scitala* (as Dr. Sharp remarks), and I am not at all confident that the discovery of new species intermediate in their characters will not eventually be fatal to its claim to be regarded as a good genus; I do not think that I should venture to found a new genus for its species if Dr. Sharp had not done so. I have already *(vide supra)* described as *Scitala Ino* an insect which certainly departs from *Scitala* in the direction of *Anodontonyx*. Only one of the characters attributed to *Anodontonyx* seems to me really to distinguish its species from all the species of *Scitala*—viz., "*(antennarum) clava perbrevi*," and even this needs amplification by the additional statement that in *Anodontonyx* (so far as at present known) antennal sexual characters are almost non-existent. However, as the genus has been formed, and its known species are certainly distinguishable by the antennal character, I think it should be retained, at any rate provisionally. And here it seems necessary to remark that the two species described by Dr. Sharp as members of *Anodontonyx* differ from each other by a character that seems to me even more important from the generic point of view than the antennal structure, which (I have several times already expressed the opinion) is of singularly slight value among the Australian *Sericoides*. I refer to the vestiture of the sterna, which in the first species described (*vigilans*, the typical species I presume) are said to be "fere nuda," while in the other species *(Harti)* they are called "parum hirsuta." I have before me specimens in good condition which are either identical with the two species under discussion or extremely close to them (see notes below), and I find that in one of those species the sterna are almost without pilosity (more nearly glabrous than I believe any *Scitala* to be when in fresh condition), and in the other notably more pilose than in any *Scitala* known to me. It is therefore quite possible,—inasmuch as the pilosity in the Australian *Sericoides* certainly has its distinctive types running through whole series of species that are associated by other well-marked generic characters—that whether *Anodontonyx* stand as a good genus or not, another new generic name may eventually be considered desirable for the species Dr. Sharp described as *A. Harti*, and for some others closely allied to it, which are noted in the following pages.

In respect of the already described species attributable to *Anodontonyx*, I think they have been described under eight names (one of which, *A. (Scitala) languida*, Er., seems to be merely a synonym of *A. (Sericesthis) nigrolineata*, Boisd.), viz., Dr. Sharp's two and the five that I have already indicated under the heading of *Scitala* (above). To these I now add nine additional. The following table will show characters by which the species of the genus may be identified. The subsequent pages contain descriptions of the new species, and notes on those previously named. The descriptions of three species *(A. vigilans*, Shp., *Harti*, Shp., and *rugosula*, Har.) do not indicate characters that enable me to place those species in my tabulation.

A. Antennæ consisting of only eight joints.
- B. Joint 2 of antennæ more or less globular, and considerably stouter than third joint.
  - C. Hind corners of pronotum not explanate. Head non-pilose, unless on margin.
    - D. Prothorax at its widest not behind middle.
      - E. Pronotum moderately closely and not particularly finely punctulate.
        - F. Prothorax quite (or all but) twice as wide as long.
          - G. Dorsal surface not iridescent.

H. Intermediate tarsi nearly twice as long as their tibiæ ... planiceps, *Blackb.*

HH. Intermediate tarsi very little longer than their tibiæ ... parvipes, *Blackb.*

GG. Dorsal surface somewhat brilliantly iridescent ... ... gravicollis, *Blackb.*

FF. Prothorax much less transverse ... ... tetricus, *Blackb.*

EE. Pronotum very finely and sparsely punctulate ... ... consanguineus, *Blackb.*

DD. Prothorax at its widest behind middle.

E. Hind angles of prothorax from all points of view rounded or very obtuse.

F. Lateral parts of pronotum very closely (almost confluently) punctulate ... creber, *Blackb.*

FF. Lateral parts of pronotum much less closely punctulate.

G. Body entirely atro-cyaneous (strongly iridescent) ... ... micans, *Blackb.*

GG. Body ferruginous or testaceous.

H. Hind angles of prothorax quite distinct, though strongly obtuse chalceus, *Blackb.*

HH. Hind angles of prothorax quite rounded off ... ... indignus, *Blackb.*

EE. Hind angles of prothorax rectangular (viewed from above), scarcely blunted ... rectangulus, *Blackb.*

CC. Hind corners of prothorax quite strongly explanate. Head pilose nigrolineata, *Boisd.*

BB. Joint 2 of antennæ quite slender (as the 3rd joint) ... ... antennalis, *Blackb.*

AA. Antennæ consisting of nine joints ... hirticeps, *Blackb.*

A. Harti, Shp. This species must be extraordinarily close to my *A. (Sericesthis) planiceps*, which was described almost simultaneously with it. Nevertheless as Dr. Sharp states that the pygidium of *Harti* is "smooth towards the apex," and I find no trace of such a character in any of the numerous specimens before me of *planiceps*, I am obliged to treat them as distinct species. And here I may remark that, in spite of the apparent likelihood of the female differing from the male as indicated by Dr. Sharp, I am by no means satisfied that the specimens which he regarded as females of *Harti* are not really examples of another species. I have specimens of *A. planiceps* presenting no definite tarsal differences *inter se*, which seem to be certainly distinct in point of sex, differing in the structure of the pygidium and apical ventral segment. If Dr. Sharp were right concerning the sexes of *A. Harti* it is probable that my *A. (Sericesthis) parvipes* would have to be deemed the female of *A. planiceps*, but I hesitate much to accept this conclusion because, in addition to the objection arising from the presence of differences that can hardly be non-sexual among my specimens of *planiceps*, I find differences between that species and *parvipes* which do not seem likely to be sexual, especially in the maxillary palpi (the penultimate joint of which is in *planiceps* notably longer than in *parvipes)*. If it were not for the irreconcilable difference between the sculpture attributed by Sharp to the pygidium of *Harti* and the sculpture of the corresponding part in *planiceps* and *parvipes*, I should feel little doubt that the latter two are identical with what Sharp described as male and female of *Harti*. I may add, however, that I am unable to understand Sharp's statement that the prosternum of *Harti* has only a "single" carina behind the coxæ, since that seems to be intended as a character to distinguish it from *A. vigilans*, in which the prosternum is said to have a "prominent acute lamina" behind the coxæ, with no reference to the presence of two or more carinæ. *A. planiceps* has a single small cariniform projection behind its coxæ.

A. vigilans, Shp. I am regretfully compelled to disregard this species, as incapable of identification. The diagnosis furnished by its author would apply to at least half-a-dozen species known to me, and there is nothing in the appended note which distingushes it from any one of four of the species before me. As, however, Sharp makes no mention of his species being pruinose or iridescent, and states that the hind angles of the prothorax are rounded off—and in the only non-iridescent species known to me and resembling *vigilans* in size and colouring the hind angles of the prothorax are not rounded off—it is probable that I have not seen *A. vigilans*. Of the species known to me, *A. chalceus*, Blackb., is nearest to agreement with Sharp's description, and were it not for its iridescence I should name it "*vigilans*, Shp. (?)." I do not find it to be the case with these insects that iridescence fades with age.

A. gravicollis, sp. nov. Ovatus; convexus; modice nitidus; subglaber; purpureo-brunneus supra læte iridescens, clypeo antennis palpis pygidio pedibus corporeque subtus brunneo-testaceis; antennis 8-articulatis, flabello perbrevi; clypeo confertim, fronte sat crebre, minus subtiliter punctulatis; prothorace quam longiori fere duplo latiori, antice minus angustato (latitudine majori superne visa nonnihil ante medium sita), supra subfortiter sat crebre (latera versus confertim subtilius) punctulato, vix perspicue canaliculato, lateribus minus rotundatis, angulis anticis vix acutis minus productis posticis (superne visis) obtuse rectis, basi marginata utrinque parum sinuata; scutello punctulato; elytris geminato-striatis, sat crebre subfortiter punctulatis; pygidio subfortiter vix crebre (in parte mediana fere lævi) punctulato; tibiis anticis fortiter tridentatis; tarsis posticis minus elongatis minus robustis, articulo basali 2° longitudine sat æquali; coxis posticis quam metasternum multo brevioribus; segmento ventrali apicali postice truncato. Long., $4\frac{4}{5}$ l.; lat., $2\frac{3}{5}$ l.

The most distinctive characters of this species (in comparison with its immediate allies) seem to be the purplish-red tone of colour of its dorsal surface—perhaps not constant—its bright iridescence, and the form of its prothorax (comparatively wide in front, with the greatest width slightly in front of the middle). When I described *A. micans* (Pr. Lin. Soc., N.S.W., 1890, p. 546), I unfortunately confused this species with it as a colour var., and wrote the diagnosis with a view to indicate a much greater variety of colouring than I have now any reason to think can be found in that species. The specimen described was one of those called in the appended note "a bright blue insect." Consequently I have found it necessary to provide a correction of the description of *A. micans (vide infra)*. I believe the type of *A. gravicollis* to be a female.

South Australia.

A. tetricus, sp. nov. Ovatus vel subovalis; modice convexus; minus nitidus; metasterno longe minus crebre setoso; niger vel piceo-niger, antennis palpis tarsis et (nonnullorum exemplorum, ? alterutrius sexus) tibiis anticis rufis; antennis 8-articulatis, flabello perbrevi; clypeo confertim subrugulose, fronte sat crebre, subfortiter punctulatis; prothorace quam longiori ut 8 ad 5 latiori, antice sat angustato, supra sat crebre subfortiter punctulato, vix perspicue canaliculato, lateribus leviter arcuatis, angulis anticis vix acutis parum productis posticis (superne visis) rectis, basi marginata utrinque leviter sinuata; scutello punctulato; elytris fortiter geminato-striatis, crebre sat fortiter punctulatis, interstitiis inter striarum paria sat fortiter convexis; pygidio minus crebre vix fortiter punctulato; tibiis anticis extus tridentatis; tarsis elongatis robustis, posticorum articulo basali quam 2^{us} vix breviori; coxis posticis quam metasternum multo breviori; segmento ventrali apicali postice leviter vel vix emarginato. Long., $4\frac{1}{2}$-$5\frac{1}{2}$ l.; lat., $2\frac{1}{5}$-$2\frac{2}{5}$ l.

Of this insect five specimens are before me, but I can find no differences among them that I can confidently affirm to be sexual. Some examples are decidedly ovate, others scarcely dilated behind the middle; in four the front tibiæ are red, in one black; in three the pygidium is distinctly more convex than in the two others; in three the apical ventral segment is decidedly emarginate behind, in two scarcely emarginate. The species is very distinct from *planiceps*, Blackb., not only by its colouring, but also by, *inter alia*, the much less strongly rounded sides of its pronotum, the much more strongly convex interstices between the striæ of each pair of geminate striæ, and the maxillary palpi (especially the penultimate joint) notably shorter.

New South Wales: Bathurst, Jenolan Caves, etc.

A. consanguineus, sp. nov. Ovalis; sat convexus; pronoto sparsim subtiliter punctulato, basi utrinque vix sinuata; scutello vix perspicue punctulato; elytris minus crebre punctulatis; cetera ut *A. tetricus, Blackb.* Long., 5 l.; lat., $2\frac{1}{5}$ l.

It seems unnecessary to repeat the characters which this species shares with *A. tetricus;* the diagnosis of that species correctly describes the present one except in respect of the characters noted above, which are strongly marked ones. The front tibiæ of this species are red and the apical ventral segment is scarcely emarginate behind. The punctures of the pronotum in this species are very much finer than in *A. planiceps*, Blackb.; in *A. tetricus* they are a trifle coarser and stronger than in the latter.

New South Wales: Bathurst.

A. creber, sp. nov. Leviter ovatus (subparallelus); convexus; sat nitidus; subglaber; ferrugineus; supra sat iridescens; antennis 8-articulatis, flabello perbrevi; clypeo confertim, fronte sat crebre, sat subtiliter punctulatis; prothorace quam longiori fere duplo latiori, antice sat angustato, supra sat subtiliter sat crebre (latera versus fere confluenter) punctulato, antice leviter canaliculato, lateribus sat rotundatis, angulis anticis acutis sat productis posticis nullis, basi marginata utrinque leviter sinuata; scutello punctulato; elytris geminato-striatis, crebre minus fortiter punctulatis; pygidio crebre vix fortiter punctulato; tibiis anticis extus fortiter tridentatis; tarsis posticis modicis minus robustis, articulo basali quam 2^{us} sat breviori; coxis posticis quam metasternum multo brevioribus; segmento ventrali apicali transversim concavo postice late rotundato (fere subtruncato). Long., 5 l.; lat., $2\frac{3}{5}$ l.

Less ovate and a little more elongate than *A. indignus*, Blackb., and easily distinguishable from it by the notably finer and closer puncturation of its head pronotum and elytra. The elytral punctures on the interval between the subsutural stria and the next pair of striæ would, if placed in regular rows, form five rows in this species, but would form only four rows in *indignus*. On account of its somewhat less robust tarsi I think it likely that the type of this species is a female.

South Australia: near Adelaide.

A. (Sericesthis) micans, Blackb. As noted above under the heading of *A. gravicollis*, sp. nov., I find it necessary to amend the description of *A. micans* as follows:—For "rufa, capite prothorace elytrisque rufo-cœruleis iridescentibus," read "atro-cœruleus, læte iridescens, palpis antennis tarsisque rufescentibus"; and in the last line of the diagnosis, to "truncato" add "vel leviter emarginato."

A. chalceus, sp. nov. Ovatus; convexus; sat nitidus; subglaber; rufo-testaceus, supra iridescens; antennis 8-articulatis, flabello perbrevi; clypeo confertim, fronte minus crebre, parum fortiter punctulatis; prothorace nitido, quam longiori fere duplo latiori, antice sat angustato, supra subfortiter sat crebre (latera versus magis crebre) punctulato, parum manifeste canaliculato, lateribus sat rotundatis, angulis anticis acutis sat productis posticis (superne visis) obtusis, basi marginata utrinque manifeste sinuata; scutello punctulato; elytris geminato-striatis, sat crebre subfortiter punctulatis; pygidio sat crebre vix fortiter punctulato; tibiis anticis extus tridentatis; tarsis posticis modice elongatis sat robustis, articulo basali quam 2^{us} nonnihil breviori; coxis posticis quam metasternum multo brevioribus; segmento ventrali apicali postice leviter emarginato. Long., 6 l.; lat., 3 l.

Rather brightly iridescent, the iridescence in some lights having a brassy tone. Among the species bearing a general resemblance to it in size colouring and vestiture this species is distinct by its pronotum at its widest evidently behind the middle (viewed from above) and having puncturation which becomes only moderately closer and finer near the lateral margins; also by its pronotum being notably more nitid than in its immediate allies. I am doubtful of the sex of the type. The decidedly emarginate apex of the apical ventral segment, and the somewhat elongate and robust hind tarsi, perhaps indicate its being a male. I have two specimens of narrower and less ovate build and having somewhat less robust tarsi, but not otherwise noticeably different, which may be the other sex, but it is quite possible that they represent another species.

In this species the prothorax is evidently less convex than in most of its allies (*e.g.*, *creber*, Blackb., *gravicollis*, Blackb.) which may be readily seen if specimens be looked at from in front, and which moreover causes the pronotum viewed from the side to appear not so high from the lower to the upper (as seen from that point of view) outline as in *creber*, etc.

New South Wales: Braidwood.

A. indignus, sp. nov. Ovatus; convexus; modice nitidus; subglaber; ferrugineus; supra sat iridescens; antennis 8-articulatis, flabello perbrevi; clypeo confertim subrugulose, fronte sat crebre, sat fortiter punctulatis; prothorace quam longiori duplo latiori, antice sat angustato, supra sat crebre (nonnihil acervatim) sat fortiter punctulato, antice leviter canaliculato, lateribus sat rotundatis, angulis anticis acutis sat productis posticis nullis, basi marginata utrinque leviter sinuata; scutello punctulato; elytris geminato-striatis, fere ut pronotum sed nonnihil subseriatim punctulatis; pygidio crebre subfortiter punctulato; tibiis anticis extus fortiter tridentatis; tarsis posticis modicis minus gracilibus, articulo basali quam 2^us^ manifeste breviori; coxis posticis quam metasternum multo brevioribus; segmento ventrali apicali transversim leviter concavo, postice late rotundato. Long., 5 l.; lat., $2\frac{4}{5}$ l.

This species is distinguishable among its immediate allies by the hind angles of its prothorax entirely rounded off, in combination with comparatively strong and not very close puncturation of its pronotum, which is about as close and fine as—but a little stronger than—the corresponding sculpture in the species which I regard (and which stands generally in collections) as *Sericesthis (Melolontha) pruinosa*, Dalm. I am in some doubt of the sex of the specimens before me, but am disposed to think them males on account of the comparative stoutness of the tarsi, which are certainly more slender in some specimens of at least one allied species.

South Australia: taken, I think, near Adelaide.

A. rectangulus, sp. nov. Elongatus, vix ovatus; sat convexus; modice nitidus; subglaber; ferrugineus, supra leviter iridescens; antennis 8-articulatis, flabello perbrevi; clypeo confertim, fronte minus crebre, parum fortiter punctulatis; prothorace nitido, quam longiori fere duplo latiori, antice minus angustato, supra subfortiter sat crebre (latera versus paullo magis subtiliter paullo magis crebre) punctulato, vix perspicue canaliculato, lateribus modice arcuatis, angulis anticis acutis modice productis posticis bene determinatis obtusis (superne visis, fere rectis), basi marginata utrinque parum sinuata; scutello punctulato; elytris geminato-striatis, sat crebre subfortiter punctulatis; pygidio sat crebre subfortiter punctulato; tibiis anticis extus tridentatis; tarsis posticis modicis, articulo basali quam 2us manifeste breviori; coxis posticis quam metasternum sat multo brevioribus; segmento ventrali apicali leviter emarginato. Long., 4½ l.; lat., 2⅕ l.

Easily distinguishable from its near allies by the well-defined hind angles of its prothorax, which, viewed from above, seem to be almost right angles, but when looked at from the side are seen to be in reality decidedly obtuse. I have four specimens which I took flying in the evening; all are in good condition. I can find no difference likely to be sexual among them, unless it be that one of them is more ovate and a little less elongate than the others. The body beneath is very nitid, the metasternum with only a few fine hairs.

New South Wales: Blue Mountains.

A. (Scitala) languida, Er. (*? = Sericesthis nigrolineata*, Boisd.). In a former memoir (Pr. Lin. Soc., N.S.W., 1890, pp. 541, etc.) I have discussed the various species which Boisduval named (the word "described" is hardly applicable) under the undescribed generic name *Sericesthis*, and in that memoir I indicated (as was then the case) that I had no specimen before me which I could confidently identify with *A. languida*, Er., but mentioned that previous authors had made the name a synonym of *A. nigrolineata*, Boisd. Having subsequently seen, as noted under *Scitala*, the type of *S. languida*, Er., I am able to say that the synonymy cited is probably correct, for the following reasons. There are two species, and only two, known to me which the very short description of *nigrolineata* will fit, viz., that which is accepted (correctly, I believe), as *Sericesthis (Melolontha) pruinosa*, Dalm., and *Anodontonyx (Scitala) languida*, Er. That the latter is the species Boisduval described rests upon the authority of Blanchard. Now Blanchard presumably had before him the type of Boisduval's species, but certainly not that of *languida*, nor of *S. pruinosa*, Dalm. He, however, had before him Tasmanian specimens of an insect which he regarded as *languida*, Er There can be little doubt that he was right in so regarding them, so far as I can judge, inasmuch as I have never seen *S. pruinosa*, Dalm., from Tasmania, and should probably have done so if it occurred (at any rate commonly) in Tasmania; and, moreover, if it had been before Blanchard he could not possibly have supposed it to be *languida*, Er. The conclusion, therefore, seems unavoidable that the very recognizably-described *A. languida* must be regarded as identical with the scarcely-described *A. nigrolineata* of Boisduval, and that the latter name must stand.

(2) *A. (Sericesthis) nigrolineata*, Boisd. This is a common species and seems to be widely distributed, as I have specimens that seem to be specifically identical from various localities in Tasmania, Victoria, and New South Wales. I can find no well-defined sexual differences among them; some, however (which I take to be males) are of subparallel elongate form with the ventral segments much flattened, while others are somewhat strongly ovate in form, with ventral segments more convex.

A. hirticeps, sp. nov. Ovatus vel sat parallelus; convexus; minus nitidus; subglaber, sed capite antice setis elongatis erectis vestito; antennis 9-articulatis, flabello perbrevi; clypeo confertim, fronte sat crebre, subfortiter punctulatis; prothorace quam longiori vix fere duplo latiori, antice sat angustato, supra minus crebre parum subtiliter nec profunde punctulato, vix perspicue canaliculato, lateribus parum arcuatis, angulis anticis acutis posticis acute rectis, basi marginata utrinque parum sinuata; scutello punctulato; elytris geminato-striatis, fortiter fere subrugulose punctulatis; pygidio sat crebre minus fortiter punctulato; tibiis anticis extus tridentatis; tarsis posticis modicis, articulo basali quam 2^{us} manifeste breviori; coxis posticis quam metasternum multo brevioribus; segmento ventrali apicali postice haud vel vix emarginato. Long., $4\frac{2}{5}$-$5\frac{1}{2}$ l.; lat., 2-$2\frac{1}{2}$ l.

This is the only *Anodontonyx* known to me with antennæ of 9 joints. Its resemblance is to *A. nigrolineata*, Boisd., from which it differs, independently of its antennæ, by, *inter alia*, its very evidently less rugulose elytra. I do not find any definite sexual differences among the four specimens before me.

New South Wales: Sydney.

A. antennalis, sp. nov. Leviter ovatus; minus convexus; parum nitidus; subglaber, clypeo (exempli typici) setis elongatis erectis perpaucis vestito; hoc fortiter minus confertim, fronte sparsim subtiliter, punctulatis; antennis 8-articulatis, articulo 2° gracili sat elongato, flabello perbrevi; palporum maxillarium articulo apicali quam penultimus vix dimidio longiori; prothorace quam longiori fere duplo latiori, antice minus angustato, supra crebre subtiliter (latera versus, confertim) punctulato, haud (exempli typici) canaliculato, lateribus leviter arcuatis, angulis anticis posticis (superne visis) acute rec-

(2) *Vide infra* (Note A).

tis, basi marginata utrinque leviter sinuata; scutello punctulato; elytris geminato-striatis, sat fortiter sat crebre fere subrugulose, punctulatis; pygidio confertim fortius subrugulose punctulato; tibiis anticis extus tridentatis; tarsis posticis sat elongatis, articulo basali quam 2us sat breviori; coxis posticis quam metasternum duplo brevioribus; segmento ventrali apicali postice manifeste emarginato. Long., 4 l.; lat., 2 l.

This species is an extremely isolated one in respect of several characters. Its short maxillary palpi (especially the short apical joint) are remarkable. Its antennæ are quite unique in the genus (if not among all the Australian *Sericoides*), the second joint being (not a part of the scape, which consists only of the basal joint, but) evidently a part of the stipes, and not at all thicker than the 3rd joint. The general appearance is that of a very small specimen of *A. nigrolineata*, Boisd. I believe the type to be a male.

New South Wales: near the National Park.

NOSPHISTHIS.

I have not anything to be added to my remarks on this genus in Tr. R. Soc., 1898, pp. 38, 39; but have recently received a second species of which the following is a description.

N. Perkinsi, sp. nov. Sat nitida; testacea, supra magis ferruginea; pilis elongatis fimbriata; corpore subtus pygidioque pilosis; capite confertim rugulose punctulato, clypeo late truncato-rotundato antice fortiter reflexo; palporum maxillarium articulo penultimo quam antepenultimus sat multo breviori; antennis 9-articulatis, flabello perbrevi quadrato 3-articulato; prothorace sat fortiter transverso, minus convexo, antice fortiter angustato, perspicue canaliculato, quam caput multo sparsius punctulato, lateribus arcuatis, angulis anticis vix acutis posticis obtusis, basi utrinque leviter sinuata; scutello punctulato; elytris æqualiter sat fortiter striatis, interstitiis leviter convexis fortius vix crebre punctulatis; pygidio subnitido, confertim subtiliter subaspere punctulato; tarsis sat brevibus, articulo apicali inter unguiculorum baseos lamina utrinque instructo, posticorum articulo basali quam 2us sat breviori; coxis posticis brevibus. Long., $5\frac{1}{2}$ l.; lat., $2\frac{1}{2}$ l.

Notably smaller and of narrower form than *N. parvicornis*, Blackb. The type is much paler in colour. The prothorax is much less convex transversely (*i.e.*, much less declivous on the sides). The elytra are more regularly striate (in *parvicornis* there is an evident want of evenness in the sublateral striæ making some of the interstices wider in some than in other parts of their length.). The elytral interstices are more decidedly convex, the pygidium more nitid and by no means so extremely closely punctulate, and the penultimate joint of the maxillary palpi is shorter (in *parvicornis* longer) than the antepenultimate joint.

North Queensland. Sent by Mr. Perkins.

FRENCHELLA.

Although this genus was founded so recently as in 1892, species referable to it seem to have been described under other generic names by most of the earlier authors. It is undoubtedly a near ally of *Haplonycha*, but the entirely different character of the elytral sculpture in its species from that of the species of *Haplonycha* (with no intermediate forms, so far as I have observed) appears to me fully to warrant a separate generic name. An elytral sculpture uniform in kind unquestionably accompanies persistent structural characters of apparently greater importance through all the extensive genera of Australian *Sericoides*, from which it may fairly be concluded that a particular type of elytral sculpture is generic. If *Frenchella* were included in *Haplonycha* the genus so constituted would furnish the only instance known to me of any considerable variety in kind (as distinguished from degree) in elytral sculpture within the limits of a genus.

The assignment to *Frenchella* of species described by the early authors is a matter of considerable difficulty and calls for a separate note on each of those which there seems to be any ground for referring to the genus.

Haplonycha rugosa, Burm. On full reflection I think that this is most probably the species that I called *Frenchella aspericollis*, and I therefore propose to sink my name in favour of Burmeister's.

Haplonycha striatella, Blanch. The phrase "elytris transversim confluenter punctatis" in Blanchard's description fits no Australian *Sericoid* species known to me except *Diphyllocera kirbyana*, White. Unfortunately Blanchard gives no information beyond "N. Holland" as to the habitat of his species and no statement of size except that it is "smaller than *H. obesa* and *scutalis*." The description of *H. striatella* fits the female of *D. kirbyana* very well except that the scutellum is called "læve," which it is not in *kirbyana*, but nevertheless I believe it to be that insect. I cannot find any mention of *D. kirbyana* under that name in Blanchard.

Haplonycha iridescens, Blanch. I identify this species with confidence. Its characters will be found indicated in the following tabulation.

A. Antennæ consisting of only eight joints.	
B. Pronotum punctured much less closely than the head	hispida, *Blackb.*
BB. Pronotum (especially on the lateral parts) punctured scarcely or not less closely than head.	
C. Pygidium not distinctly carinate, and scarcely rugulose	approximans, *Blackb.*
CC. Pygidium very strongly carinate and rugulose	rugosa, *Burm.*
AA. Antennæ consisting of nine joints.	
B. Hind angles of prothorax sharply defined.	
C. Head and pronotum clothed with long erect fine hairs	hirticollis, *Blackb.*
CC. Head and pronotum glabrous (unless at margins).	
D. Puncturation of elytra rugulose and somewhat close	iridescens, *Blanch.*
DD. Puncturation of elytra non-rugulose and much less close ...	sparsiceps, *Blackb.*
BB. Hind angles of prothorax rounded off, or very obtuse.	
C. Prothorax considerably less than twice as wide as long	lubrica, *Blackb.*
CC. Prothorax fully twice as wide as long	calorata, *Blackb.*

F. calorata, sp. nov. Ovata, convexa; parum nitida; supra subglabra; subtus sat pilosa; antennis 9-articulatis, flabello modico quam articuli 2-6 conjuncti sublongiori; capite pronotoque confertim minus fortiter sat rugulose sat æqualiter punctulatis; prothorace quam longiori duplo latiori, antice modice angustato, supra haud canaliculato, lateribus sat fortiter rotundatis, angulis anticis acutis modice productis posticis rotundatis, basi marginata utrinque vix manifeste sinuata; scutello confertim subtilissime punctulato; elytris obsolete striatis, interstitiis latis planis vix crebre sat subtiliter punctulatis; pygidio confertim subtilissime punctulato; tibiis anticis fortiter dilatatis extus obtuse bidentatis; tarsis posticis minus elongatis, articulo basali quam 2us sublongiori; coxis posticis quam metasternum multo brevioribus; segmento ventrali apicali truncato. Long., 6 l.; lat., $3\frac{1}{5}$ l.

I feel some hesitation in placing this species in *Frenchella*. I have no doubt the unique type is a female, and it is quite likely that the discovery of the male will eventually involve the creation of a new genus for its reception. I do not, however, find any definite character in the female inconsistent with its being a *Frenchella* except the remarkable structure of its front tibiæ, which are those of a *Pachygastra*, from which genus its large head, broad clypeus and elytral striæ non-geminate, *inter alia*, separate it very widely. In my tabulation of the Australian *Sericoid* genera (Tr.R.S., S.A., 1898, pp. 32-34) I relied upon the remarkable form of the front tibiæ as a generic character, which renders it necessary for me to add *(vide infra)* a note on *Pachygastra* calling attention to this insect which, in the absence of the male, I must regard as a *Frenchella* presenting a very exceptional character. It should be noted that in this species the apical joint of the labial palpi, without differing very strongly from the *Frenchella* type, is certainly less elongate and cylindrical than in the other species known to me of the genus.

North Queensland. Sent by Mr. Koebele.

Platydesmus.

The species of this genus have been found as yet (so far as I know) only in New South Wales and Queensland. They are somewhat closely allied to *Frenchella*, but are readily distinguishable from that genus by the structure of their labial palpi. They are for the most part notably smaller than the species of *Frenchella* and are insects of less robust build, with the antennal sexual characters—so far as known—more pronounced, the flabellum of the male, at any rate, being notably longer, and the antennal difference between the sexes being in the one species of which the female is known very much greater. The antennæ in all the known species consist of nine joints and in all except one the flabellum has only three joints. The following table indicates characters by which the known species may be identified. They are for the most part insects of dull colours and not particularly interesting appearance.

A. Antennal flabellum consisting of only three laminæ.	
B. Basal 2 joints of hind tarsi scarcely differing in length.	
C. Pronotum coarsely punctulate ...	sulcipennis, *Macl.*
CC. Pronotum finely punctulate ...	obscuricornis, *Blanch.?*
BB. Basal joint of hind tarsi notably shorter than 2nd joint.	
C. Prothorax fully twice as wide as long	major, *Blackb.*
CC. Prothorax notably narrower ...	inamœnus, *Blackb.*
AA. Antennal flabellum consisting of four laminæ	inusitatus, *Blackb.*

P. (Haplonycha) obscuricornis, Blanch. I have before me several specimens of a *Platydesmus* (from the neighbourhood of Sydney) which appear to be in all probability identical with Blanchard's *Haplonycha obscuricornis*. I should consider the identification quite reliable if it were not that a discrepancy certainly exists in respect of the colouring of the antennæ. Blanchard says "antennis obscure rufis, clava picea." "Obscure rufæ" is fairly applicable to the antennæ of the species before me, but I do not find that the flabellum of any of the specimens is conspicuously darker than the preceding joints. The agreement, however, with the description is so satisfactory in all other respects that I am disposed to conjecture the antennal flabella of the type to have been discoloured by some accidental means and to give this *Platydesmus* the name "*P. (Haplonycha) obscuricornis*, Blanch. (?)." It is an insect somewhat closely allied to *P. sulcipennis*, Macl., which is the type of the genus, differing from it *inter alia* by the closer and considerably finer puncturation of the dorsal surface. In the present species the dorsal puncturation in all parts is not much different from the corresponding puncturation in the common species known as *Sericesthis (Melolontha) pruinosa*, Dalm.; in *sulcipennis* much coarser. In colour this insect is extremely variable, only one of the specimens known to me being coloured (disregarding the antennal flabellum) as the type, in the rest the head pronotum elytra pygidium legs and undersurface being some or all of them more or less reddish. One of the specimens before me is evidently a female—the only female *Platydesmus* that I have seen. It is of evidently robuster and more convex form than the male, with the antennal flabellum much shorter (scarcely longer than joints 2-6 together), the tarsi evidently smaller, the pygidium less convex, the abdomen very convex longitudinally (*i.e.* as viewed from the side), with its apical segment widely rounded behind. In the male the abdomen is much flattened, with its apical segment not conspicuously different from that of the female.

P. sulcipennis, Macl. My specimen of this insect was given to me by Sir W. Macleay, and I have since compared it with the typical example.

P. major, sp. nov. Mas. Ovalis; sat niditus; supra subglaber, lateribus ciliatis; subtus sat pilosus; totus ferrugineus; antennis 9-articulatis, flabello perlongo (quam prothorax nullo modo breviori) arcuato 3-articulato; palpis maxillaribus sat elongatis, quam capitis inter oculos latitudo parum brevioribus; clypeo confertim vix subrugulose, fronte pronotoque crebre nec rugulose, subtilius punctulatis; prothorace quam longiori duplo latiori, antice haud fortiter angustato, mox ante basin setis elongatis fimbriato, lateribus leviter arcuatis, angulis anticis sat obtusis posticis obtusis subrotundatis, basi marginata utrinque sinuata; scutello fere lævi; elytris sat fortiter punctulato-striatis, striis haud geminatim ordinatis, interstitiis planis sat fortiter vix crebre punctulatis; pygidio fere ut pronotum, sed in media parte fere lævi, punctulato;

tibiis anticis extus tridentatis; tarsis posticis modicis, articulo basali quam 2^{us} sat breviori; coxis posticis brevibus, metasterno duplo brevioribus; segmento ventrali apicali postice leviter emarginato. Long., 7 l.; lat., 3½ l.

Its large size, very long antennal flabellum, long maxillary palpi, and very short hind coxæ (scarcely half as long as the metasternum) render this species very distinct from its known congeners. None of these characters, however, appear to me to indicate generic distinctness.

New South Wales: Young. Given to me by Mr. Sloane.

P. inamœnus, sp. nov. Mas. Ovatus; sat nitidus; supra subglaber, lateribus ciliatus; subtus pilosus; totus ferrugineus; antennis 9-articulatis, flabello 3-articulato haud arcuato sat elongato (capiti longitudine sat æquali); palpis maxillaribus minus elongatis, quam capitis inter oculos latitudo multo brevioribus; capite crebre vix subrugulose minus subtiliter, pronoto subtilius minus crebre, punctulatis; prothorace quam longiori fere ut 5 ad 3 latiori, antice sat fortiter angustato, lateribus modice arcuatis, angulis anticis acutis posticis bene definitis obtusis, basi marginata utrinque sinuata; scutello fere lævi; elytris sat fortiter punctulato-striatis, striis haud geminatim ordinatis, interstitiis planis sat fortiter subcrebre punctulatis; pygidio sat crebre sat fortiter (sed in media parte fere lævi) punctulato; tibiis anticis extus tridentatis; tarsis posticis modicis, articulo basali quam 2^{us} sat breviori; coxis posticis sat brevibus sed quam metasternum nullo modo duplo brevioribus; segmento ventrali apicali postice leviter emarginato. Long., 5 l.; lat., 2½ l.

An insect of unattractive appearance, not unlike the preceding (*P. major*) in respect of colouring and sculpture; but much smaller and with much shorter antennal flabellum (which is not curved), much shorter maxillary palpi, prothorax much less strongly transverse, etc., etc.

North Queensland. Sent to me by Mr. Sloane.

P. inusitatus, sp. nov. Mas. Ovatus; sat nitidus; supra subglaber, lateribus ciliatis; subtus pilosus; piceo-ferrugineus, antennis capite pronotoque obscurioribus; antennis 9-articulatis, flabello 4-articulato arcuato sat elongato (quam caput nonnihil longiori); palpis maxillaribus minus elongatis, quam capitis inter oculos latitudo multo brevioribus; capite confertim subrugulose minus subtiliter, pronoto fortiter sat crebre, punctulatis; prothorace quam longiori ut 4½ ad 3 latiori, antice sat fortiter angustato, lateribus modice arcuatis, angulis anticis acutis posticis obtusis, basi marginata utrinque sinuata; scutello fere lævi; elytris fortiter punctulato-striatis, striis haud geminatim ordinatis, interstitiis convexis fortiter sat crebre punctulatis; pygidio sat crebre minus fortiter (sed in media parte fere lævi) punctulato; tibiis anticis extus tridentatis; tarsis posticis modicis, articulo basali quam 2us sat breviori; coxis posticis sat brevibus sed quam metasternum nullo modo duplo brevioribus; segmento ventrali apicali postice vix emarginato. Long., 5 l.; lat., $2\frac{2}{5}$ l.

The only *Platydesmus* known to me in which the antennal flabellum of the male consists of four joints. The alternate interstices of the elytra are a trifle wider than the other interstices but there is no real approximation to the kind of elytral sculpture that distinguishes the group of genera in which I have called the elytra "geminate-striate." The scutellum, as in some other species where I have used the term "*sublævi*," has only three or four punctures, generally near the base.

Queensland: Tambourine Mount. Sent to me by Mr. French.

Sericesthis.

S. (Scitala) suturalis, Macl. The unique type of this species in the Australian Museum is in very bad condition having lost its antennæ. There can however be no reasonable doubt of its being a true *Sericesthis* closely allied to *S. pruinosa*, Dalm. It is however a good species readily distinguishable from *pruinosa* by the pronotum at its hind angles expanded and distinctly upturned.

S. (Scitala) pruinosella, Brenske. I can find no mention of any character in the description of this species inconsistent with its being a later name for *S. suturalis*, Macl.

Neso.

I have to add another species to this genus. The following table shows the distinctive characters of the five species now known. The three species previously described by me differ considerably *inter se* in the antennal sexual characters. In *usta*, Blackb., the laminæ of the male are straight and about equal in length to the preceding joints together; in *yorkensis*, Blackb., the laminæ are distinctly longer and are curved; in *planicollis*, Blackb. [=*flavipennis (Platydesmus)*, Macl.] they are curved and still longer (well on to twice as long as the preceding joints together). In *usta*, moreover, the elytra are constantly,—so far as I have observed,—of a dark umber-brown colour,—in the other two, testaceous. The new species described below is not very close to the others, being much larger, with prothorax of different shape, pygidium carinate (at least in the female), etc. *Scitala armaticeps*, Macl., is (as noted above under *Scitala)* a member of this genus, and the name *Scitala impressa*, Brenske, probably is also a name of the same insect. Having examined in the Macleay Museum the type of *Platydesmus flavipennis*, Macl., I am able to say that it also is a *Neso* and is identical with my *N. planicollis*.

A. A conspicuous transverse carina on the clypeus ... ... armaticeps, *Macl.*

AA. Clypeus not having a transverse carina.

  B. Hind angles of prothorax scarcely defined and very blunt. Size small.

    C. Elytral interstices in all respects uniformly punctulate ... ... usta, *Blackb.*

    CC. Alternate interstices of elytra not punctured uniformly with the other interstices.

      D. Pronotum quite strongly declivous behind ... ... yorkensis, *Blackb.*

      DD. Pronotum not declivous behind flavipennis *(Platydesmus)*, *Macl.*

  BB. Hind angles of prothorax (viewed from above) well defined and almost right angles. Size large ... ... ducalis, *Blackb.*

N. ducalis, sp. nov. Fem. Ovata; subnitida; supra subglabra; subtus breviter pilosa; obscure ferruginea; antennis 9-articulatis, flabello 3-articulato quam articuli præcedentes conjuncti sat breviori; clypeo confertim rugulose, fronte sat crebre nec rugulose, minus fortiter punctulatis; prothorace quam longiori ut 7 ad 4 latiori, antice sat fortiter angustato, supra vix crebre minus fortiter punctulato, lateribus (superne visis) leviter arcuatis postice subparallelis, angulis anticis subacutis parum productis posticis (superne visis) fere rectis bene definitis, basi utrinque leviter sinuata ante scutellum subtiliter marginata; scutello fere lævi; elytris punctulato-striatis, striis manifeste geminatim ordinatis, interstitiis alternis haud (alternis leviter) convexis (alternis sat crebre, alternis minus crebre, punctulatis); pygidio longitudinaliter carinato, crebre fortiter sat rugulose punctulato; tibiis anticis extus tridentatis; tarsis posticis modicis sat robustis, articulo basali quam 2^{us} nonnihil breviori; coxis posticis quam metasternum sat brevioribus; segmento ventrali apicali, postice subtruncato. Long., 7 l.; lat., 4 l.

This species, as noted above, is readily separated from its known congeners by its much larger sizes, differently-shaped prothorax, etc. The fine raised line on the basal margin of the pronotum in front of the scutellum is very distinct in this species and is more or less distinctly traceable when looked for in all the other species of *Neso* that I have examined except in *N. usta*, Blackb., and the typical specimen of *N. armaticeps*, Macl.

North Queensland: Cairns. Sent by Mr. R. C. L. Perkins.

Sciton.

The species of this genus seem to be extremely rare in collections. The following new species is in the South Australian Museum.

S. variicollis, sp. nov. Fem. Leviter ovatus; sat elongatus; subopacus, nonnihil pruinosus; supra glaber; subtus parce pilosus; rufoferrugineus, antennarum flabello testaceo; capite confertim subtilius ruguloso, hoc inter oculos quam clypei margo anticus truncatus ut 4 ad 3 latiori; antennis 9-articulatis, flabello quam articuli 2-6 conjuncti breviori; prothorace quam longiori ut 7 ad 4 latiori, antice leviter angustato, supra subtilius sat crebre punctulato, postice sat fortiter declivi, lateribus (superne visis) leviter arcuatis, angulis anticis acutis minus productis posticis (superne visis) obtusis, basi marginata utrinque sinuata, scutello punctulato longitudinaliter leviter carinato; elytris geminato-striatis, interstitiis subfortiter sat crebre punctulatis (alternis angustis convexis); pygidio nitido crebre subtiliter punctulato; tibiis anticis extus tridentatis; tarsorum posticorum articulo basali quam 2^{us} sat longiori, coxis posticis quam metasternum sat brevioribus; segmento ventrali apicali postice subtruncato. Long., $7\frac{1}{2}$ l.; lat., $3\frac{1}{2}$ l.

Resembles *S. ruber*, Blackb., from which it differs *inter alia* by its clypeus wider in front (in *ruber* the truncate front margin of the clypeus is very little more than half as wide as the interval between the eyes), its prothorax less transverse and less narrowed in front and strongly declivous behind, and the basal joint of its hind tarsi notably longer in proportion to the 2nd joint. Its very much larger size, as well as its clypeus wider in front, etc., readily distinguishes this species from *S. paullus*, Blackb.

Western Australia: Coolgardie.

Byrrhomorpha.

I have before me an undescribed species belonging to Mr. Lea which is certainly a member of this genus, although its inclusion therein involves the removal from the generic diagnosis of the words "labrum supra clypeum sursum productum." The genus, however, is abundantly distinct on account of other characters, and as the form of the labrum was not referred to in my tabulation of Australian *Sericoid* genera in placing *Byrrhomorpha*, the fact now indicated that that character is here (as in *Heteronyx)* not generic, will not introduce confusion into the use of the tabulation.

B. anomala, sp. nov. Ovatus; valde robusta; valde convexa; subnitida; subglabra; nigro-picea, antennis palpisque rufis; capite prothoraceque confertim rugulose sat fortiter punctulatis; antennis 9-articulatis, flabello 4-articulato, hujus laminis (exempli typici) articulis 2-5 conjunctis longitudine sat æqualibus; labro sat porrecto sed haud reflexo; clypeo profunde emarginato; prothorace quam longiori ut 7 ad $4\frac{1}{2}$ latiori, antice fortiter angustato, lateribus leviter arcuatis, angulis anticis acutis sat productis posticis (superne visis) rectis extrorsum subproductis, basi marginata utrinque leviter sinuata; scutello magno basin versus punctulato; elytris geminatim striatis, sat fortiter rugulose punctulatis, interstitiis alternis angustis sat lævibus; pygidio fere ut pronotum punctulato; tibiis anticis extus tridentatis; tarsorum posticorum articulo basali quam 2^{us} paullo breviori; coxis posticis quam metasternum duplo brevioribus; segmento ventrali apicali postice sinuato. Long., $6\frac{1}{2}$ l.; lat., $3\frac{1}{2}$ l.

This species is of more elongate form than its described congeners, and differs notably from them both in the flabellum of its antennæ consisting of four laminæ. The sculpture of the elytra in this species resembles that of *B. ponderosa*, Blackb. except in the puncturation of the alternate (wide) interstices being much closer and much less coarse. I believe the specimen before me to be a female, judging from the form of its ventral segments. Among the comparatively few specimens that I have seen of the genus I do not find any strongly-marked characters likely to be sexual, and it is possible that I have seen only one sex.

New South Wales: Galston.

The following table shows distinctive characters of the three species now known.

A. Antennal flabellum consisting of only three laminæ.
  B. All the elytral interstices decidedly, and about equally, convex. Size small ... ... verres, *Blackb.*
  BB. Only the alternate narrow interstices of the elytra convex. Size much larger ... ... ponderosa, *Blackb.*
AA. Antennal flabellum consisting of four laminæ ... ... anomala, *Blackb.*

It will be well to add, here, a note that *Scitala pallidula*, Macl. (of which I have recently examined the type) might perhaps by my tabulation of the Australian *Sericoid* genera be referred to *Byrrhomorpha*, on account of its clypeus being lightly emarginate across the front. *S. pallidula* is, as indicated above, an isolated form which may prove, when its sexes are known, to require the formation of a new genus (as Macleay forecasted). It is, however, very far removed from *Byrrhomorpha* which is a genus of extremely robust coarsely sculptured insects with hind tibiæ very stout and strongly dilated at their apex; while *S. pallidula* is altogether of the *Scitala* build,—of fragile form and having hind tibiæ elongate slender and almost without apical dilatation.

Ocnodus.

The presence of conspicuous tufts of hairs on the under surface of the tarsal joints seems to be the most noticeable character of this genus. The extremely short hind coxæ also furnish a noteworthy character. The antennal structure, judged by the species as yet known, seems to be uniform—which is very unusual in the Australian *Sericoides*. The structure of the labrum is extremely variable and furnishes a valuable specific character. The form of the hind angles of the prothorax is most remarkable. In all the species known to me these angles are really obtuse or subrectangular, but owing to the curve of the convexity on the dorsal surface (except perhaps in *O. lugubris*, Blackb.), they appear acute or even spiniform if the prothorax be looked down upon from directly above it. I have now three additional species before me which are described below. The following table shows characters by which the species known may be distinguished.

It is possible that some of the insufficiently-described species of the early authors (discussed by me under the heading of *Scitala*, &c.) may be attributable to this genus, but I think it improbable, as the genus is not known to occur in the localities where most of the species in question were found.

When I described the *Coleoptera* of the Elder Expedition I attributed to this genus with a strong expression of doubt a species which I described under the name *ferrugineus*. I am now satisfied that it must not remain associated with the other species referred by me to *Ocnodus*, and that its real affinities are with *Caulobius*, under which generic name I have already recorded it (above) in this memoir.

I must here repeat what I have already notified, viz., that since I have never succeeded in identifying the typical species of *Ocnodus* (*O. decipiens*, Burm.) there is a doubt whether the species to which I have applied the name *Ocnodus* are really congeneric with Burmeister's insect. It will be well to remember that the generic position of those species will be best expressed by calling them *Ocnodus*, Blackb. (?Burm.).

A. Elytra non-setose.
  B.* Labrum small, scarcely projecting from front face of head, its summit very distant from summit of front face of head.
    C. Basal edging of pronotum very distinctly thickened and more elevated at its ends.
      D. Clypeus evenly rounded in front — fallax, *Blackb.*
      DD. Clypeus truncate in front ... — lepidus, *Blackb.*
    CC. Basal edging of pronotum uniformly fine ... ... — lugubris, *Blackb.*
  BB. Labrum much larger, distinctly prominent, its summit not much below summit of front face of head.
    C. Clypeus in front widely and very feebly emarginate.
      D. Basal declivity of pronotum nitid and almost punctureless (a row of punctures close to basal edging) ... ... — suspiciosus, *Blackb.*
      DD. Basal declivity of pronotum punctured scarcely differently from the rest of the surface ... — spinicollis, *Blackb.*
    CC. Clypeus in front deeply angularly emarginate ... ... — scissiceps, *Blackb.*
  BBB. Labrum (viewed from above) scarcely prominent, but its summit near summit of front face of head — porosus, *Blackb.*
AA. Elytra setose ... ... — decipiens, *Burm.*

O. lepidus, Blackb. I have recently received two female specimens of *Ocnodus* taken by Mr. Perkins in Queensland, which I regard with some hesitation as this species, of which the male only was previously known. They are somewhat larger (long. 6 l.) than I should expect the female of *lepidus* to be and are considerably less nitid than the male, with the dorsal puncturation a trifle stronger and the hind angles of the prothorax slightly less obtuse, so that from a certain point of view (looked at obliquely across the insect) they appear more sharply subdentiform than those angles appear in *lepidus* (male) from a similar point of view. Moreover the hind tarsi are evidently stouter (which is not likely, I think, to be a female sexual character). It is quite possible, therefore, that they represent a distinct closely allied species.

O. lugubris, Blackb. At the time when I described this species I regarded my specimens as females, but I have now no doubt that one of them is a male. Its sexual characters, however, are very slight, consisting in considerably greater stoutness of the front tarsi, less convexity of the ventral segments, and a difference in the pygidium—which is perpendicular in the female but inclined inward in the male so that

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* For notes on labrum *vide infra O. porosus*, sp. nov.

its apex seems to push a little into the apical ventral segment.

O. suspiciosus, sp. nov. Mas. Ovalis; sat nitidus; subglaber; piceus, antennis palpisque testaceis; illis 9-articulatis, flabello 3-articulato quam articuli præcedentes 5 subbreviori; labro magno producto profunde emarginato; clypeo crebre fortiter subrugulose punctulato, antice late leviter emarginato, fronte fortiter minus crebre nec rugulose punctulato; prothorace quam longiori fere duplo latiori, antice parum angustato, supra fortiter inæqualiter vix crebre punctulato, basin versus fere lævi, lateribus leviter sinuatim arcuatis, angulis anticis subacutis parum productis posticis (superne visis) acutis subdentiformibus, basi marginata utrinque sinuata; scutello punctulato; elytris fortiter sat crebre subseriatim punctulatis; pygidio crebre sat grosse punctulato; tibiis anticis extus fere inermibus; tarsis anticis quam tibiæ multo longioribus, posticorum articulo basali quam 2^{us} sublongiori; coxis posticis quam metasternum fere triplo brevioribus; segmento ventrali apicali postice late leviter emarginato; corpore subtus fortiter punctulato. Long., $4\frac{1}{2}$ l; lat., 2 l.

The elytral puncturation gives a slight suggestion of geminate arrangement in the form of pairs of rows of punctures slightly more regularly seriate than the intermediate rows (about three in number) which occupy the intervals between those pairs. This species is somewhat close to *O. spinicollis*, Blackb. It is smaller and in all parts somewhat less strongly punctulate, the pronotum almost punctureless immediately in front of the base, the hind angles of the pronotum less dentiform, the clypeus in front less widely and a little more strongly emarginate, the external margin of the front tibia with only a single feeble projection above (and close to) the apical projection (in *spinicollis* there are two strong teeth above the apical projection), the pygidium non-carinate. It is possible that some few of the above distinctions may be sexual rather than specific and may be absent in the female of *O. suspiciosus*, but that is not likely since I do not find them distinguishing the sexes in *O. lugubris*,—the only species of the genus of which I am confident that I have seen both sexes.

Western Australia: Perth. Sent by Mr. Hamilton.

O. scissiceps, sp. nov. Mas. Breviter ovalis; minus nitidus; subglaber; rufopiceus, antennis palpisque nonnihil dilutioribus; illis 9-articulatis, flabello 3-articulato quam articuli præcedentes 5 conjuncti manifeste breviori; labro magno producto, profunde bilobo, lobis (superne visis) subspiniformibus; clypeo antice profunde angulatim emarginato, cum fronte confertim fortiter ruguloso; prothorace quam longiori duplo latiori, antice quam postice haud angustiori, supra confertim subtilius punctulato, lateribus (superne visis) leviter sinuatim arcuatis angulis anticis acutis sat productis posticis (superne visis) sat acute rectis, basi marginata utrinque parum sinuata; scutello crebre sat subtiliter punctulato; elytris crebre sat subtiliter (hic et illic subseriatim) punctulatis; pygidio pernitido, grosse crebrius punctulato, obsolete carinato; tibiis anticis extus minus perspicue dentatis; tarsis anticis quam tibiæ paullo longioribus, posticorum articulo basali quam 2^{us} vix longiori; coxis posticis quam metasternum plus quam duplo brevioribus; segmento ventrali apicali per pygidium (hoc subtus flexo) profunde emarginato; corpore subtus fortiter punctulato. Long., $4\frac{1}{2}$ l.; lat., $2\frac{1}{5}$ l.

The pygidium strongly bent under the body and causing the apical ventral segment to be strongly emarginate seems to indicate the unique specimen before me of this insect to be certainly a male. In the other males known to me of the genus a similar structure is slightly discernible (as compared with the structure of the same parts in the specimens which I judge to be females of the genus). I have not found in it any other character likely to be sexual on account of its being common to the other males and not to the females known to me of the genus. There is an almost obsolete blunt tooth on the external margin of the front tibiæ slightly above the apical projection. The elytra present slight indications of geminate sculpture in a tendency of the punctures to fall into pairs of traceable rows,—the pairs being separated by intervals in which there is no trace of seriate arrangement, but this character in the sculpture needs to be looked for, being very inconspicuous. The species is very isolated among its congeners by many characters,—form of labrum and clypeus, comparatively fine puncturation of dorsal surface, etc.

Western Australia: Coolgardie. Taken, I believe, by my son.

O. porosus, sp. nov. Breviter late ovalis; sat nitidus; subglaber; piceo-niger, antennis palpisque rufis; illis 9-articulatis, flabello 3-articulato quam articuli præcedentes 5 conjuncti manifeste breviori; labro sat magno parum producto (hujus altitudine quam clypei frontis pars supra majori); clypeo antice rotundato, cum fronte grosse sat crebre punctulato; prothorace quam longiori duplo latiori, antice parum angustato, supra sparsim sat grosse punctulato, lateribus (superne visis) leviter sinuatim arcuatis, angulis anticis acutis sat productis posticis (superne visis) sat acute dentiformibus, basi marginata utrinque sinuata; scutello basin versus punctulato; elytris grosse subseriatim minus crebre punctulatis, stria subsuturali sat perspicua; pygidio grosse sat crebre punctulato; tibiis anticis extus tridentatis; tarsis anticis quam tibiæ vix longioribus, posticorum articulo basali quam 2us vix longiori; coxis posticis quam metasternum fere triplo brevioribus; segmento ventrali apicali postice haud emarginato; corpore subtus grosse punctulato. Long, $3\frac{1}{2}$ l.; lat., $1\frac{4}{5}$ l.

The labrum resembles that of *O. fallax*, etc., in respect of its only slight projection from the perpendicular front face of the head but differs by its much larger size which may be expressed as follows:—Looking (from in front) at the front face of the head one sees the outline of the clypeus as an arc of a circle the altitude of which is evidently greater than the distance from the vertex of the labrum to the vertex of the perpendicular front face of the head, while in *fallax*, etc., the corresponding altitude occupies a very much smaller proportion of the front face of the head. The extremely coarse puncturation of the dorsal surface prevents the confusion of this species with any other *Ocnodus* known to me.

Western Australia: Yilgarn.

Diphyllocera.

D. kirbyana, White. Burmeister has drawn attention to the fact that the antennal flabellum of this species consists of five lamellæ according to White and of six according to Erickson. In the male there are six lamellæ of about equal length, while in the female the basal lamella is so short that its being in reality a joint of the flabellum might easily be overlooked. As White describes the male it is clear that he either counted incorrectly or had before him a species unknown to subsequent authors and distinct from that which has since borne the name *kirbyana*.

Pachygastra.

In my tabulation of the Australian *Sericoid* genera *(loc. cit.)* this genus is distinguished by the form of its front tibiæ. It should be noted that I have described, above, a new species under the name *calorata* having front tibiæ not much different from those of *Pachygastra* but which certainly cannot be regarded as a member of that genus. I have placed it in *Frenchella*.

Mæchidius.

M. raucus, sp. nov. Late ovatus; minus convexus; minus nitidus; piceo-niger, antennis palpisque rufis; setulis brevibus subtilibus sat crebre vestitus; capite antice sat profunde subangulatim emarginato (partis emarginatæ lobis antice rotundatis), lateribus sinuatis; prothorace quam longiori fere ut 5 ad 3 latiori, antice sat fortiter angustato, supra crebre fortiter ruguloso, lateribus crenulatis fortiter dilatato-rotundatis ante basin brevissime rectis, angulis anticis sat productis sat acutis posticis acute rectis, basi late rotundata; scutello punctulato; elytris striis circiter 9 impressis, interstitiis latis inæqualiter biseriatim granulosis, interstitiis alternis manifeste convexis; tibiis anticis extus tridentatis (dentibus inferioribus approximatis, a 3° sat remotis); tarsis robustis sat brevibus, posticorum articulo basali quam 2^{us} paullo longiori; unguiculis singulis ad basin appendiculis singulis gracilibus armatis. Long., 5 l.; lat., $2\frac{3}{4}$ l.

The form of the outline of the prothorax of this species is very distinctive, the nearest approach to it, in *Mæchidii* known to me, being found in *M. crenaticollis*, Blackb. The sides of the prothorax are extremely strongly dilatate-rounded from the front margin almost to the base, but immediately in front of the base they become quite straight (and parallel with each other). The above-mentioned character (together with other characters) places the insect in my tabulation (Tr.R.S., S.A., 1898, pp. 57, etc.) beside *M. caviceps* although the sides of the prothorax in that species are not sinuate behind the middle, the hind angles are obtuse, and there is very little superficial resemblance between the two. From *crenaticollis*, to which it has much superficial resemblance, it differs *inter alia* by the presence of quill-like appendages to its claws.

Victoria: Dividing Range.

M. relictus, sp. nov. Leviter ovatus; minus latus; sat convexus; sat nitidus; ferrugineus; setulis brevibus subtilibus minus crebre vestitus; capite antice sat profunde emarginato (partis emarginatæ lobis antice rotundatis), lateribus manifeste sinuatis; prothorace quam longiori fere duplo latiori, antice sat fortiter angustato, supra puncturis sat magnis mamillatis sat crebre impresso, lateribus haud crenulatis sat arcuatis, angulis anticis sat productis minus acutis posticis rotundato-obtusis, basi utrinque sinuata; scutello punctulato; elytris inæqualiter sculpturatis (in parte dorsali intervallis circiter 5 leviter convexis sat latis utrinque sat grosse punctulato-crenulatis, in parte laterali sat confuse crenulato-punctulatis); tibiis anticis extus tridentatis (dentibus inferioribus inter se approximatis a 3°,—hoc in longitudine media sito,—

sat remotis); tarsorum posticorum articulo basali quam 2^us sat longiori; unguiculis singulis ad basin appendiculis singulis gracilibus armatis. Long., 3 l.; lat., $1\frac{3}{4}$ l.

In my tabulation of the species of *Mæchidius (loc. cit.)* this species must be placed beside *M. caviceps*, Blackb., from which it differs by, *inter alia*, its clypeus considerably less deeply excised with the lobes of the excision rounded (not externally angulate) in front, and by its elytral sculpture [which in *caviceps*, Blackb. consists of about 18 striæ,—the lateral ones scarcely defined,—the interstices scarcely and *inter se* subequally convex and obscurely seriate-granulate; while in *relictus* the elytra cannot be called distinctly striate the sculpture consisting of rows of punctures (some of them moderately, others very, large) among which are about 5 irregular distinctly elevated intervals having their sides strongly crenulate by the adjacent punctures]. In my original description of *M. caviceps* I did not mention the granulation of the elytral interstices. The granules are small and inconspicuous (less so on the sides and apical parts of the insect) and were concealed by a thin indumentum which I find was present on the typical specimen in the S.A. Museum: but inspection of the elytral interstices of a second example recently acquired by me shows the presence of fine granules.

North Queensland. Taken by Mr. Perkins.

M. capitalis, sp. nov. Breviter ovatus, sat convexus; subnitidus; obscure ferrugineus, antennis palpisque dilutioribus; setulis brevibus subtilibus minus crebre vestitus; capite antice obtuse truncato, lateribus vix sinuatis; prothorace gibbo, leviter transverso, antice fortiter angustato, supra confertim sat fortiter ruguloso, lateribus subcrenulatis sat arcuatis pone angulos posticos (his subrectis) excisis, angulis anticis minus productis minus acutis, basi late rotundata; scutello magno punctulato; elytris striis circiter 9 sat latis impressis, interstitiis sat latis sat planis (his utrinque punctulato-crenulatis); tibiis anticis (exempli typici) extus sinuatis haud perspicue dentatis; tibiis posterioribus 4 in parte media dente instructis (ut *M. tibialis*, Blackb.); tarsis posticis brevibus, posticorum articulo basali quam 2^us vix longiori; unguiculis simplicibus. Long., 4 l.; lat., $2\frac{1}{5}$ l.

In my tabulation of the species of *Mæchidius (loc. cit.)* this species must be placed beside *M. rugosipes*, Blackb., from which it differs by *inter alia* its clypeus truncate in front and its prothorax scarcely transverse. Its short robust posterior tibiæ with their external face transversely carinate at about the middle of their length so that the outline appears strongly dentate in the middle distinguish this species at once from all other *Mæchidii* known to me except *tibialis*, Blackb., and *rugosipes*, Blackb.

Western Australia: Gnarlbine. Given to me by Mr. French.

DYNASTIDES.

Pimelopus.

P. porcellus, Er. A specimen taken on King Island must certainly, I think, be attributed to this species. It agrees with Erickson's description except in size,—being considerably smaller than the type,—and in the prothorax being considerably (not "scarcely") narrowed in front. The size is of little importance, since other species of the genus vary greatly in this respect; and I am of opinion that Erickson was in error in respect of the prothorax. In all the *Pimelopi* known to me the actual front margin, owing to the front part of the pronotum being very strongly declivous is not in sight from certain points of view, and it is easy to place a specimen so that the prothorax appears to be wide in front; but if the prothorax be examined with the head towards the observer the front margin is seen to be in reality much narrower than the base. I cannot help thinking that this accounts for the discrepancy between the King Island example and the description of *P. porcellus*. If the front margin of the prothorax were really "scarcely" narrower than the base *P. porcellus* would, I think, stand alone in this respect among the Australian *Dynastides*,—with the exception of a few species of the very aberrant genus *Cryptodus*. The examination of a specimen so likely (on the ground of its habitat) to be the true *P. porcellus* is of interest on account of my having (Tr.R.S., S.A., 1887, p. 220) described as "*P. porcellus*, Er. (?)" a species that is certainly not identical with this King Island specimen. For this South Australian species I now propose the name *decipiens*. Its female differs from the King Island example (which is a female, as also was Erickson's type) principally in the shape of the prothorax, which is very strongly bisinuate at the base, so that the middle part appears as a very well-defined lobe; while in the King Island example the bisinuation is very feeble making the base appear as an almost continuous curve. The basal impressions of the pronotum are in *decipiens* strongly marked and in the King Island example very feeble. The striation of the elytra is notably stronger in *decipiens*.

The King Island specimen resembles *P. dubius*, Blackb. in the form of the prothorax. And here I must call attention to an unfortunate oversight in my description of the latter species; for I passed over the description of the prothorax with the remark that that segment scarcely differed from the same in "*porcellus* (?)." At the time I had in mind other distinctions which are very strongly marked between the two species and overlooked the less conspicuous (but certainly quite obvious when attention is drawn to it) difference in the basal outline of the prothorax.

The King Island specimen agrees with *P. dubius* in having only a single transverse carina on the external face of the middle and hind tibiæ but differs from it (and agrees with *decipiens*) in the robust posteriorly-swollen form of its elytra,—which is, I suppose, what Erickson refers to when he calls the elytra of *porcellus* "ventricosa."

From the above remarks it appears so evident that the true *P. porcellus*, Er. (at any rate this species from King Island) is intermediate in structure between *P. decipiens* and *P. dubius* that there need be no further hesitation in associating those species generically. As the specimen from King Island does not fit well into the tabulation of specific characters of *Pimelopi* which I furnished in Tr.R.S., S.A., 1896, p. 256, it will be well to substitute the following tabulation:—

A. Posterior tibiæ unicarinate externally.	
B. Base of prothorax subbisinuate.	
C. Elytra strongly and subrugulosely punctulate and swollen behind ...	porcellus, *Er.*
CC. Elytra very feebly and sparsely punctulate and subparallel ...	dubius, *Blackb.*
BB. Base of prothorax very strongly bisinuate	sydneyanus, *Blackb.*
AA. Posterior tibiæ bicarinate externally.	
B. Elytral puncturation obsolete on lateral and subapical parts	crassus, *Blackb.*
BB. Elytral puncturation continuous ...	decipiens, *Blackb.*

P. decipiens, sp. nov. This name is proposed for *P. porcellus*, Er. (?), Blackb., Tr.R.S., S.A., 1887, p. 220.

P. dubius, Blackb. For amendment of original description *vide supra* under heading *P. porcellus*, Er.

CISSIDÆ.

Cis.

C. leanus, sp. nov. Minus latus; vix pubescens; sat nitidus; supra brunneo-testaceus, pronoto antice sat late et in lateribus anguste elytris in sutura et latera versus incerte infuscatis; capite sat crebre minus subtiliter nec rugulose, pronoto confertim fortiter sat rugulose, elytris quam pronotum paullo minus crebre nec rugulose, punctulatis; his circa scutellum subgibbis; antennis pedibusque testaceis, horum femoribus illarum clava infuscatis; corpore subtus (capite et prosterni lateribus exceptis) piceo, sat grosse nec profunde punctulato. Long., $\frac{4}{5}-1$ l.; lat. $\frac{3}{10}$ l.

Easily distinguishable from the other described Australian species of the genus by its colouring and its comparatively coarse puncturation. The prothorax is rather strongly transverse,—more so than in its Australian congeners (except perhaps *C. Adelaidæ*, Blackb., which approaches it in this respect) and is very little produced over the head. Of the two examples before me, one (doubtless the male) has an evident though slight gibbosity in the middle of the forehead, while the forehead of the other is very flat.

TENEBRIONIDÆ.

Hopatrides.

Herr Gebien has recently called my attention to the fact that Reitter last year, in Verh. ver., Brunn, founded a new genus of *Tenebrionidæ* under the name *Mesomorphus*, to which some of the Australian species hitherto placed in *Hopatrum* must be transferred. These species are distinguished from true *Hopatra* by the different vestiture of their tarsi, the obliteration of the clypeal suture, and their divided eyes. Champion had already noted the existence of this aggregate as a section of *Hopatrum* possibly needing to be separated generically (Tr.E.S., Lond., 1894, p. 361), and I had myself at a still earlier date (1892) mentioned the first of them that I had seen as probably needing a new generic name. Unfortunately *Mesomorphus* is a *nom. præocc.*, having been used by Pratz in 1883 *(Mesomorpha)*. As the species in question appear to me to be certainly generically distinct from *Hopatrum* I propose to give them a new genus under the name *Hopatromorpha*, which I cannot ascertain to have been used previously.

Hopatrum.

I have before me two new species of this genus, and have recently inspected the type of *H. Mastersi*, Macl. I propose before describing the new species to furnish a tabulated statement of the characters by which the species of *Hopatrum* may be distinguished *inter se*. After the removal of the species already referred to as not genuine *Hopatra* there remain ten names that seem attributable to Australian species of the genus, one of which *(H. australe*, Boisd.), I must pass over on account of its being, as Champion has already pointed out, not intelligibly described. The addition of my two new species therefore bring up the number to eleven. I have before me authentic specimens of all except one *(H. torridum*, Champ.), and I have a *Hopatrum* from north-west

Australia agreeing so well with the description of *H. torridum* that I am fairly confident of having identified it correctly.

Before proceeding to the tabulation it is desirable to furnish a note on one of the group characters that will be mentioned in it, viz., "Elytral intersices unequal." In the species to which that expression applies the 3rd and 5th interstices (especially the 3rd) are distinctly more convex than the 2nd and 4th, and the 2nd and 4th (especially the 2nd) are narrower (*very much* narrower in the hinder part) than the 3rd and 5th. In the rest of the species the interstices are uniform in respect of convexity, and there is no great diversity in respect of width.

A. Elytra entirely striate.
B. Elytral interstices unequal.
C. Sides of prothorax more or less sinuate behind middle, hind angles acute.
D. Joint 8 of antennæ twice as wide as long ... ... Mastersi, *Macl.*
DD. Joint 8 of antennæ less than twice as wide as long.
E. Elytral interstices with conspicuous well-defined granules Walkeri, *Champ.*
EE. Elytral interstices closely rugulose, not granulate ... Carpentariæ, *Blackb.*
CC. Sides of prothorax absolutely non-sinuate, hind angles blunt ... Macleayi, *Blackb.*
BB. Elytral interstices uniform—at most a little diversity in width.
C. Sides of prothorax not sinuate behind middle.
D. Prothorax at its widest across base.
E. Front of clypeus with a deep angular emargination.
F. Front tibiæ stout and very strongly dilated at apex ... Meyricki, *Blackb.*
FF. Front tibiæ slender, very feebly dilated at apex ... Elderi, *Blackb.*
EE. Front of clypeus with a shallow arched emargination ... Victoriæ, *Blackb.*
DD. Prothorax notably wider about middle than across base ... misellum, *Blackb.*
CC. Sides of prothorax quite conspicuously sinuate behind middle torridum, *Champ.(?)*
AA. Each elytron with only two strong striæ, the outer striæ obsolete ... Adelaidæ, *Blackb.*
AAA. Elytra without defined striation ... cowardense, *Blackb.*

H. Mastersi, Macl. This species is near *Walkeri*, Champ., and *Carpentariæ*, Blackb. It is identical with a *Hopatrum* sent by Mr. Perkins which (before I saw *Mastersi)* I had intended to describe as new. It is easily separated from *Walkeri* by, *inter alia*, the non-granulate interstices of its elytra.

From *Carpentariæ* it differs by, *inter alia*, the much stronger sinuation of the hind part of the sides of the prothorax and the 8th joint of its antennæ considerably more transverse.

H. Macleayi, sp. nov. Minus latum; sat opacum; piceo-nigrum, setis brevissimis vestitum; supra confertim subtilius rugulosum; clypeo a fronte discreto, antice triangulariter emarginato; oculis haud divisis; antennis modicis, articulis 8-10 sat fortiter transversis; prothorace quam longiori duplo latiori, lateribus sat fortiter explanatis sat rotundatis pone medium nullo modo sinuatis, angulis anticis minus productis minus acutis (posticis minus productis rectis), latitudine majori vix pone medium posita; elytris quam prothorax paullo latioribus, sat æqualiter sat fortiter striatis, striis quam interstitia multo magis fortiter punctulatis (illarum puncturis, præsertim postice, costulis minus perspicuis conjunctis), interstitiis convexis (3°, 5°, 7° que quam cetera manifeste magis elevatis postice latioribus); tibiis anticis a basi ad apicem sat fortiter dilatatis, angulo externo apicali sat acuto. Long., 4 l.; lat., 2 l.

The form of the prothorax seems to be the most conspicuous character of this species; the rounded sides of that segment distinctly converging from a little behind the middle to the base, but without the slightest sinuation, with front angles almost obtuse and hind corners scarcely sharply right angled, are very distinctive. The only other described species known to me with the 3rd, 5th, and 7th interstices of the elytra so strongly defined is *Walkeri*, Champ., which differs widely in the form of its prothorax.

Queensland: Toowoomba (Koebele).

H. misellum, sp. nov. Minus latum; sat opacum; piceo-nigrum; setis brevissimis vestitum; supra sat æqualiter crebre minus subtiliter rugulosum, vix granulosum; clypeo a fronte discreto, antice triangulariter emarginato; oculis haud divisis; antennis modicis, articulis 8-10 fortiter transversis; prothorace quam longiori plus quam duplo latiori, lateribus modice explanatis minus arcuatis pone medium haud sinuatis, angulis anticis acutis posticis (superne visis) acute rectis, basi media leviter emarginata, latitudine majori paullo ante basin posita; elytris quam prothorax paullo latioribus, æqualiter sat profunde striatis, striis quam interstitia multo magis fortiter punctulatis, interstitiis convexis; tibiis anticis a basi ad apicem sat fortiter dilatatis, angulo externo apicali acuto. Long., $4\frac{1}{4}$-5 l.; lat., 2-$2\frac{1}{10}$ l.

I conjecture this to be the species mentioned by Champion (Tr.E.S. 1894, p. 359) as "perhaps" *O. villiger*, Blanch., as it is the only *Hopatrum* that I have found in the neighbourhood of Port Adelaide (Champion's locality). However that may be, it is I think certainly not *H. villiger*, the elytral striæ of which are described as "without puncturation," and which moreover is said to be from "Raffles Bay" a locality on the north coast of Australia. It is nearer I think to the species that I have no doubt is *H. torridum*, Champ., than to any other described *Hopatrum*, but is readily distinguishable from it by, *inter alia*, the evidently convex interstices of its elytra, and its less opaque dorsal surface.

South Australia (widely distributed).

Hopatromorpha.

(Gen. nov. *Tenebrionidarum;* = *Mesomorphus*, Reitter, *nom. præocc.)*

Australian species of this genus have been described, I believe, under six names. The first of them is *Hopatrum villiger*, Blanch., the description of which points to its place being here. I have received, moreover, from Herr Gebien a specimen under that name which is undoubtedly a member of this genus, and it agrees fairly well with Blanchard's description. In 1892 I described a second species under the name *Hopatrum longicorne* (from Central Australia). In 1894 Champion described two species *(Hopatrum dispersum* and *vagabundum)* in the Tr.E.S., Lond., and I described (published a few months later than Champion's names) two species *(H. darlingense* and *Darwini)*. The species sent by Gebien as *villiger*, Blanch., is identical with that sent to me by its author as *dispersum*, Champ. *Dispersum* is from Port Darwin; *villiger* was described from Raffles Bay; two adjacent localities. Neither *darlingense* nor *Darwini* appears to be identical with either of Champion's species, although *vagabundum* and *Darwini* are probably somewhat close to each other. I have already (Tr.R.S., S.A., 1894, p. 218) pointed out distinctions between the two,—the former of which I have not seen and I may now add the further note that Champion calls joints 9 and 10 of the antennæ of *vagabundum* "transverse" (without qualification) whereas those joints in *Darwini* are "vix transversis" (unfortunately printed in my description "vix convexis"), and moreover the seriate elytral punctures of *Darwini* are so conspicuously very much larger than those of *dispersum*, Champ. (which indeed are almost non-existent) that Champion could not possibly have failed to refer to that distinction in differentiating *vagabundum* from *dispersum* if *vagabundum* had been my *Darwini*.

The following table shows the characters which seem to me most conveniently to be used for distinguishing *inter se* the species of this genus.

A. Prothorax strongly transverse (about twice as wide as long).	
B. Ocular canthi wide (as wide as the eye, at least in *Darwini*).	
C. Elytral interstices granulate. Joints 9 and 10 of antennæ transverse	vagabunda, *Champ.*
CC. Elytral interstices non-granulate. Joints 9 and 10 of antennæ not distinctly transverse	Darwini, *Blackb.*
BB. Ocular canthi much narrower ...	dispersa, *Champ.* villigera, *Blanch.* (?)
AA. Prothorax less transverse (about as 5 to 3).	
B. Elytral striæ quite strongly impressed	darlingensis, *Blackb.*
BB. Elytral striæ scarcely impressed (almost mere rows of faint punctures)	longicornis, *Blackb.*

H. darlingensis, Blackb. Specimens of this insect have been sent to me by Mr. Carter, of Sydney. He writes that they were sent to him by Judge Docker of Walgett, who reported the insect as occurring in great plenty in his neighbourhood. This is to me an interesting note, as I had previously seen only two examples of the species.

HELÆIDES.

Pterohelæus.

I have several interesting new species of *Pterohelæus* recently acquired in my collection appertaining to the group which Macleay in his monograph of the genus calls the 2nd subsection of the 2nd section, characterized thus:—"Form more elongate; elytra seriate-punctate, their interstices granulose." It seems desirable to make the opportunity of describing them an occasion for a revision of the group and for placing in tabular form an indication of the distinctive characters of its species. Macleay's monograph supplies merely descriptions of seven species without any tabular arrangement, while an eighth species *(P. squalidus)* decidedly belonging to this subsection is attributed to the preceding one with a note that it is perhaps wrongly placed. Since Macleay's monograph was published I have described a single species *(insignis)* of this subsection. Three species of *Pterohelæus* have been described by Lea, but without information as to which of Macleay's aggregates they appertain to; as, however, the descriptions contain no mention of elytral granules it is presumable that they are not members of the subsection that I am now dealing with. At the present time, then, species attributable to this aggregate have been described under nine names. Of these nine names one (*P. Guerini*, Brême) cannot be confidently identified with any insect by the description, which however (such as it is) would fit *P. tristis*, Germ., fairly well. (Germar's the later name.)

The following table shows characters by which the *Pterohelæi* of this group can be distinguished *inter se*, with the exception of *P. Guerini*, Brême, concerning which there is not sufficient information available for its inclusion:—

A. Joint 6 of antennæ not or but little dilated on outer margin, never decidedly transverse.
  B. Alternate striæ of elytra much deeper than the other striæ ... ... insignis, *Blackb.*
  BB. Elytra not having alternate striæ deeper than the rest.
    C. Elytra much more nitid than CC.
      D. Lateral margins of pronotum very feebly explanate ... ... simplicicollis, *Blackb.*
      DD. Lateral margins of pronotum strongly explanate.
        E. At least all the alternate interstices of elytra conspicuously and regularly granulate.
          F. Prothorax twice as wide at base as in front. Size large granuliger, *Macl.*
          FF. Prothorax much less narrowed in front. Size moderate ... ... regularis, *Blackb.*
        EE. Front and inner parts of elytra not (or only sparsely) granulate.
          F. Pronotum sparsely and faintly punctulate.
            G. Size large. Surface only moderately nitid. Lateral area of pronotum wide and flat ... ... tristis, *Germ.*
            GG. Size small. Surface quite nitid. Lateral area of pronotum narrower and concave ... ... nitidiusculus, *Macl.*
          FF. Pronotum closely and strongly, though finely, punctulate ... ... gracilicornis, *Blackb.*
    CC. Elytra notably more opaque.
      D. Explanate margin of elytra wide (at base as wide as apex of front tibia) ... ... granulatus, *Germ.*
      DD. Explanate margins of elytra much narrower.
        E. Ventral segments with scarcely any trace of longitudinal wrinkles ... ... ventralis, *Blackb.*

EE. Ventral segments with plentiful longitudinal wrinkles ... subgeminatus, *Macl.*
AA. Joint 6 of antennæ strongly dilated on outer margin, transverse.
B. Disc of pronotum conspicuously granulate-rugulose ... ... squalidus, *Macl.*
BB. Disc of pronotum not granulate-rugulose.
C. Front of pronotum very feebly emarginate, and having rounded very feeble angles ... ... bullatus, *Pasc.*
CC. Front of pronotum much more emarginate, with prominent angles (as in *granulatus*, Germ.).
D. Width of prothorax considerably more than twice length ... brevicornis, *Blackb.*
DD. Width of prothorax scarcely twice length ... ... puer, *Blackb.*

P. simplicicollis, sp. nov. Sat parallelus; subnitidus; sat convexus; nigro-piceus, marginibus antennis palpis pedibusque rufescentibus; antennis modicis (articulis 6° quam latior longiori extus haud dilatato, 7°-10° transversis extus fortiter dilatatis); capite crebre subtiliter, prothorace supra vix manifeste, punctulatis; hoc quam longior plus (quam trans apicem vix plus) quam duplo latiori, supra vix manifeste canaliculato, marginibus lateralibus minus latis a disco parum discretis, margine antico sat late minus fortiter emarginato, angulis anticis sat rotundatis posticis valde acutis; elytris seriatim subfortiter punctulatis, interstitiis alternis granulis nitidis (his antice perparvis, apicem versus gradatim multo majoribus) ornatis, margine laterali angusto (quam *P. granulati*, Germ., multo angustiori); corpore subtus sat nitido; abdomine latera versus strigato. Long., 7 l.; lat., 3½ l.

Remarkable for the expanded margins of its pronotum being narrower and less clearly distinguishable from the disc than is usual among its allies. The expanded margin of its elytra also is very narrow, much narrower than in, *e.g.*, *P. bullatus*, Pasc. The shining granules form complete rows on the alternate interstices of the elytra, but they are extremely minute on the front part and even more so near the suture than near the lateral margins.

South Australia; Eyre Peninsula. Taken by the late Mr. J. Anderson.

P. regularis, sp. nov. Sat parallelus; minus opacus; modice convexus; nigro-piceus, marginibus antennis palpis pedibusque rufescentibus; antennis modicis (articulis 6° vix transverso extus vix dilatato, 7°-10° sat transversis extus fortiter dilatatis); capite crebre subtiliter, prothorace supra sparsius subtilissime, punctulatis; hoc quam longior plus (quam trans apicem paullo minus) quam duplo latiori; supra vix manifeste canaliculato, marginibus lateralibus sat latis manifeste concavis bene definitis antice modice angustatis, margine antico late minus fortiter emarginato, angulis anticis obtusis posticis acutis; elytris seriatim subfortiter punctulatis, interstitiis alternis æquabiliter sat crebre granulis nitidis insignibus, margine laterali sat angusto (quam *P. granulati*, Germ., multo angustiori); corpore subtus sat nitido; abdomine latera versus strigato. Long., 7-8 l.; lat., $3\frac{1}{2}$-4 l.

A somewhat nitid species notable for the extremely regular rows of conspicuous shining granules that adorn the alternate interstices of its elytra. The emargination of the front of its prothorax is decidedly wide and feeble as compared with that of some *Pterohelæi*. A specimen in my collection differs from the type in being of narrower form, with the elytra a trifle less nitid and the granules smaller. The difference is perhaps sexual.

New South Wales: Narrabri, etc.

P. bullatus, Pasc. The *habitat* of this species is curiously given as "South Australia (Queensland)." The description is much too scanty to be satisfactory (*e.g.*, no information as to the antennal structure, or the width of the explanate margins of the different parts). The large size and elytral granulation, however, distinguish it from most of the *Pterohelæi*, and as I have in my collection specimens from Queensland which agree very well with the description I have not much hesitation in identifying them with it. I have also a *Pterohelæus* from South Australia, which is extremely close to it and possibly furnishes the explanation of Pascoe's statement of *habitat*, though I doubt its being really identical specifically, on account of its being of still narrower form and with somewhat different elytral granulation; but without seeing more specimens it would not be well to give it a separate name. Champion attributes *P. bullatus* to Western Australia (Tr.E.S., Lond., 1894, p. 383), but I feel some doubt as to this reference being correct.

P. gracilicornis, sp. nov. Latus; minus parallelus; subnitidus; minus convexus; nigro-piceus, marginibus antennis palpis pedibus elytrorumque granulis plus minusve rufescentibus; antennis sat gracilibus, (articulis 6° 7° que quam latiores longioribus extus hoc vix illo haud dilatatis, 8°-10° transversis extus leviter dilatatis); capite prothoraceque crebre subtilius (nullo modo obscure) punctulatis; hoc quam longior (et postice quam antice) plus quam duplo latiori, supra nullo modo canaliculato, marginibus lateralibus minus latis bene definitis fortiter concavis, margine antico profunde sat anguste emarginato, angulis anticis obtusis posticis leviter acutis; elytris leviter striatis, striis subtiliter profunde punctulatis, interstitiis alternis apicem versus granulis minutis nonnullis (his nonnihil rufescentibus) ornatis, margine laterali lato (quam *P. granulati*, Germ. nonnihil latiori); corpore subtus nitido; abdomine fere toto strigato. Long., 5 l.; lat., 3 l.

A species of broader and less parallel form than is usual in this group, resembling in outline the species that I take to be *P. peltatus*, Er. The granules on the elytra are confined to the subapical portion and are extremely small and inconspicuous.

Western Australia: Coolgardie and other localities.

P. ventralis, sp. nov. Sat parallelus; sat opacus; minus convexus; nigro-piceus, marginibus antennis palpis pedibusque rufescentibus; antennis modicis (articulis 6° quam latior longiori extus parum dilatato, 7° vix transverso extus sat dilatato, 8°-10° fortiter transversis extus fortiter dilatatis); capite crebre subtiliter, prothorace supra subtilissime minus crebre, punctulatis; hoc quam longior (et postice quam antice) plus quam duplo latiori, supra haud vel vix manifeste canaliculato, marginibus lateralibus fere ut *P. granulati*, Germ. (i.e., latis, sat planis, intus male definitis), margine antico sat anguste sat profunde emarginato, angulis anticis subrotundatis posticis sat acutis; elytris seriatim nonnihil geminatim minus fortiter punctulatis, interstitiis alternis granulis parvis nitidis sat æquabiliter ornatis, margine laterali angusto (quam *P. granulati*, Germ., multo angustiori); corpore subtus sat nitido; abdomine latera versus vix manifeste strigato. Long., 8 l.; lat., $3\frac{4}{5}$ l.

Allied to *P. granulatus*, Germ., but very distinct from it by the lateral margins of its elytra much less widely explanate; differs from *granulatus* also by, *inter alia*, its larger size, more elongate build, front of prothorax more narrowly emarginate, and with more rounded angles, elytra with more numerous granules, ventral segments almost without longitudinal wrinkles, etc.

Western Australia: Coolgardie, etc.

P. brevicornis, sp. nov. Elongatus; sat parallelus; sat opacus; minus convexus; piceus, antennis palpis marginibus pedibus et corpore subtus plus minusve rufescentibus; antennis brevibus (articulis 6° quam latior haud longiori extus fortiter dilatato, 7°-10° fortiter transversis extus fortiter dilatatis); capite prothoraceque supra subtiliter sat crebre punctulatis; hoc quam longior duplo (postice quam antice dimidia parte) latiori, supra vix perspicue canaliculato, marginibus lateralibus latis (fere ut *P. granulati*, Germ.) extus manifeste reflexis intus manifeste definitis, margine antico sat profunde emarginato, angulis anticis obtusis posticis acutis; elytris seriatim subtiliter punctulatis, interstitiis planis (alternis granulatis), granulis parvis (his scutellum versus minutissimis), margine laterali sat angusto (quam *P. granulati*, Germ., multo angustiori); corpore subtus sat nitido. Long., $6\frac{1}{2}$ l.; lat., 3 l.

This species is readily distinguishable, in the aggregate having the 6th joint of the antennæ strongly dilated, by its very short antennæ, depressed form, flat elytral interstices, and very fine elytral granules,—the latter almost obsolete in the scutellar region. Its prothorax resembles that of *P. bullatus*, Pasc.

Central Australia. From the collection of the late J. Anderson.

P. puer, sp. nov. Sat parallelus; minus opacus; sat convexus; ferrugineus vel piceo-ferrugineus, marginibus antennis palpis pedibus et corpore subtus dilutioribus; antennis sat brevibus (articulis 6° quam latior haud longiori extus sat fortiter dilatato, 7°-10° fortiter transversis extus fortiter dilatatis); capite subtiliter, prothorace supra subtilissime, sat crebre punctulatis; hoc quam longiori vix plus quam duplo (postice quam antice dimidia parte) latiori, supra vix vel haud manifeste canaliculato, marginibus lateralibus latis (fere ut *P. granulati*, Germ.) extus perspicue reflexis intus bene definitis, margine antico sat profunde emarginato, angulis anticis obtusis posticis acutis; elytris seriatim sat subtiliter punctulatis, interstitiis alternis leviter convexis sat æquabiliter sat crebre granulis nitidis insignibus, margine laterali sat angusto (quam *P. granulati*, Germ. multo angustiori); corpore subtus sat nitido; abdomine latera versus crebre strigato. Long., $6\frac{1}{2}$-7 l.; lat., 3-$3\frac{1}{5}$ l.

Allied to *P. bullatus*, Pasc., from which it differs by *inter alia* its smaller size, its prothorax less transverse more narrowed and more deeply emarginate in front and with much better defined front angles, the alternate interstices of its elytra more distinctly convex, and the 6th joint of its antennæ scarcely transverse. In some examples the elytra have a slightly bronzy tone.

Western Australia. Apparently widely distributed.

LONGICORNES.

Macrones.

M. Besti, sp. nov. Elongatus; rostro testaceo; palpis obscure brunneis; antennis nigris apicem versus nonnihil picescentibus; capite postice nigro, pone oculos fortiter transversim rugato; prothorace nigro obscure rufescenti, quam latiori sublongiori, subtiliter aspero, tripartito, (hoc superne viso parte antica sat æquali ad latera dilatata; parte media fortiter elevata, in medio late profunde longitudinaliter sulcata, disco utrinque obsolete bituberculato, angulis posticis subdentiformibus, lateribus valde rotundato-dilatatis; parte postica minus brevi,—fere ut *M. rufi*, Saund.); scutello nigro; elytris pallide testaceis, sutura margine laterali lineisque discoidalibus 2 costiformibus, parte subsuturali lævi parte externa crebre sat fortiter punctulata; pedibus rufis, femoribus posticis in medio tibiis (basi summa et parte apicali exceptis) tarsisque anterioribus 4 infuscatis; sternis obscure rufis, abdomine (segmento basali albido excepto) rufo; femoribus nonnihil subclavatis, fere ut *M. rufi*, Saund. Long., 12 l.; lat., $1\frac{3}{5}$ l.

Easily distinguishable from the other described species of the genus by its colouring. Apart from colouring and size the known species of *Macrones* resemble each other rather closely. The following characters in combination, however, separate the present species satisfactorily from the rest (except *subclavatus*, Pasc. which I do not know, but which is very differently coloured): eyes large (as in *rufus)*, and round; head very strongly wrinkled transversely in hind part; intermediate area of pronotum widely and equally sulcate in its whole length and having its sides roundly dilated; basal area of pronotum as long as in *rufus;* femora comparatively robust and subclavate (as in *rufus)*. In respect of colouring, the head and prothorax black or dark piceous with the muzzle testaceous (almost whitish) separate this *Macrones* from all the others yet described.

Victoria: Buffalo Mount; taken by Messrs. Best and French, jun.

PHYTOPHAGA.

Paropsis.

P. acclivis, sp. nov. Mas. Sat late subovata, minus convexa, altitudine majori (a latere visa) sat longe pone marginem medium posita; modice nitida; ferruginea, elytris verrucis nigris ornatis, corpore subtus nigro rufo-variegato, antennis basi excepta obscuris; capite inæquali minus subtiliter sat rugulose punctulato, basin summam versus nigricanti; prothorace quam longiori ut $2\frac{4}{5}$ ad 1 latiori, ab apice sat longe ultra medium dilatato, crebre sat fortiter (ad latera grosse rugulose) punctulato, lateribus fortiter arcuatis, late leviter deplanatis, angulis posticis nullis; scutello sublævi; elytris sub callum humeralem depressis, pone basin transversim leviter impressis, crebre fortiter sat seriatim (ad latera paullo magis, postice paullo minus, grosse) punctulatis, verrucis (his a basi ad apicem continuis) nonnullis elongatis nonnullis rotundatis instructis, interstitiis sat rugulosis, parte marginali a disco (per sulculum minus perspicua) indeterminate divisa, calli humeralis margine interno a sutura quam ab elytrorum margine sat multo magis distanti; segmento ventrali basali (hoc rufo) sparsim subtiliter punctulato; antennarum articulo 3° quam 4^{us} paullo longiori. Long., $5\frac{1}{2}$ l.; lat., $3\frac{1}{2}$ l.

In Proc. Linn. Soc., N.S.W., 1901 (p. 160), I furnished a classification of the groups into which it appeared to me that the genus *Paropsis* could conveniently be divided. The present species appertains to Group iii. as there characterized. In *loc. cit.* 1896 (p. 643) I divided that group into sub-groups of which sub-group ii. must receive this species. In *loc. cit.* (pp. 653-657) I tabulated the then known species of this sub-group and in that tabulation the present species must be placed beside *P. comma*, Blackb., from which it may be thus distinguished:—

KK. Form much less wide; elytra less rounded at sides.
- L. Greatest height of the insect (viewed from the side) not behind middle of elytral margin ... ... comma, *Blackb.*
- LL. Greatest height of the insect (viewed from side) considerably behind middle of elytral margin ... ... acclivis, *Blackb.*

I have no doubt that this distinction is shared by the female (which I have not seen). The greatest height of the insect is placed further from the base than in any other nearly allied species. It also differs from *P. comma* in numerous other respects, *e.g.*, larger size, narrower build, humeral callus much nearer lateral margin of elytra, absence of markings on the pronotum, sides of pronotum less distinctly (though not less widely) explanate, evidently closer puncturation of elytra. Compared with *P. serpiginosa*, Er., it is much larger, with its pronotum much more widely explanate, etc.,—besides differing by the character tabulated above. From *P. baldiensis*, Blackb., it differs *inter alia multa* by the extreme feebleness of the post-basal impression on its elytra, and from *P. Sloanei* (also somewhat like it superficially) by *inter alia* the presence of a well-marked depression below the humeral callus. It should be added that the elytra of this insect are more or less clouded with a darker colour than that of the general surface, giving them in some examples a blotchy appearance, which obscures the verrucæ.

King Island (Mr. Lea).

Arsipoda.

Specimens of an *Arsipoda* taken by Mr. Lea on King Island appear on a first inspection to differ from *A. variegata* more definitely than is consistent with their representing a mere variety. Nevertheless, comparison with specimens which I have taken in Victoria and New South Wales and have been unable to distinguish from *variegata* by any satisfactory character, leads me to the conclusion that it would not be justifiable to treat these insular examples as a good species. I have from the Blue Mountains specimens which are distinctly intermediate in shape, colouring, and sculpture between those from King Island and ordinary Tasmanian specimens. It is of course possible that there are at least three or four very closely allied species very limited in habitat, of which *variegata* is one, but I cannot satisfy myself that that is the case. The present form may be characterized as follows:—

A. kingensis, Blackb. (? *variegata*, Waterh., *var.*). Quam forma normalis magis angusta, magis ovata; colore magis pallida (antennis fere totis testaceis); pronoto magis fortiter punctulato.

Appended Note.

Since writing my remarks on *Anodontonyx nigrolineata*, Boisd. I have examined a specimen in the Macleay Museum bearing a ticket in the handwriting of Mr. W. S. Macleay "*Sericesthis nigrolineata*, Macl." As W. S. Macleay was a contemporary of Boisduval and is quoted in Dejean's Cat. as authority for the name *nigrolineata* I have little doubt that Boisduval's name was taken from a specimen considered identical with that I am referring to. The specimen in the Macleay Museum bearing Macleay's label is specifically identical with that which was sent to me from Berlin as the type of *Scitala languida*, Er. This evidence seems to be finally conclusive in confirming the identity of *Anod. (Seric.) nigrolineata*, Boisd. and *Anod (Scit.) languida*, Er. The Macleay Museum also possesses a specimen ticketed in W. S. Macleay's writing "*Sericesthis sublineata*, Macl." Although I cannot find any description to have been published under that name it may be well to note here that the specimen in question is merely a slight colour-var. of *A. nigrolineata* differing from the type by the feebleness of the black lines on its elytra.

The Quality of the Secondary Ionisation due to β Rays.

By W. H. Bragg, M.A., F.R.S., Elder Professor of Mathematics and Physics in the University of Adelaide, and J. P. V. Madsen, B.Sc., B.E., Lecturer on Electrical Engineering.

[Read October 1, 1907.]

The so called secondary radiation due to β rays has been studied by many observers. Quite recently McClelland and H. W. Schmidt have contributed important sets of papers upon the subject.

It is usual to estimate the amount or the energy of the primary and secondary streams by measuring the ionisation produced within an ordinary ionisation-chamber placed in the path of the rays, the principal reason being that such measurements can be made with convenience and accuracy.

But it is only under very special conditions that this procedure is legitimate, because the β particle produces more ions in traversing a given space when its velocity is small than when it is great; in other words, the ionisation increases as the speed diminishes. If two streams of β radiation are to be compared by this method, it is one of the essential conditions of success that the velocities of the two streams shall be the same, or similarly distributed. This would not be necessary if the ionisation-chamber were made so large that even the fastest β particles spent their ionising powers within it, and if the whole ionisation produced by a β particle might be taken as a measure of its energy. But it is usual to employ a small chamber, placed comparatively near to the source of the rays; and in this way an unfair advantage is given to the particles of smaller velocity.

The experiments to be described in this paper show that the secondary radiations returned by different substances struck by the same primary stream are not uniform in quality, but vary from substance to substance. When the atomic weight of the substance is small, the radiation is relatively soft; it contains a larger proportion of less penetrating rays. If, therefore, the constants of secondary ionisation are measured in the usual way, they are exaggerated in the case of substances of low atomic weight, as compared with those the atoms of which are heavier.

For the purpose of observing the secondary ionisation due to β rays we have adopted the form of apparatus shown

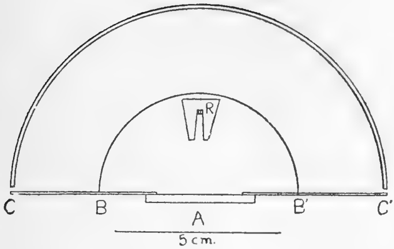

FIG. I.

in the figure. The plate at A scatters in all directions the radiation which it receives from the radium at R. Nearly all the returned particles strike the hemispherical wall BB′ of the ionisation chamber, the larger hemisphere CC′ being connected to the electrometer. The usual shielding devices are used, but not shown in the figure. This arrangement gathers in the effects of all the secondary rays, so that a measurable effect is obtained, even when only a small quantity of radium is used.

When the cup or dome BB is made of very thin Al foil, stretched on a frame of a few fine wires, the effects obtained by placing plates of different metals at A approximate to those given by McClelland—that is to say, the curve which shows the relation between secondary ionisation and atomic weight, is of the same general form as McClelland's, though somewhat flatter. But when the dome is thickened by the addition of layers of tinfoil, there is a considerable alteration. The addition of tinfoil of a tenth of a millimetre in thickness is sufficient to make the curve almost linear, and the ionisation is then nearly proportional to the atomic weight of the radiator.

The figures in the following table show the results of an experiment of this kind. They give the ionisation currents, on an arbitrary scale, for different radiators and different thicknesses of the dome. The smaller figures are only approximate: —

	Pb.	Ag.	Zn.	Fe.	S.	Al.	C.
1. Thin Al leaf	1300	1010	798	679	484	391	166
2. Sn. foil ·0065 mm	1124	829	627	519	352	276	141
3. " ·043	414	272	189	145	85	57	21
4. " ·080	210	129	87	65	35	21	8
5. " ·116	125	71	45	32	19	12	5
6. " ·153	76	42	29	21	13	7	5

Assuming that the returned radiation is really due to a scattering of the primary beam, there are two ways of interpreting these results. The β radiation of radium is heterogeneous, and consists of rays of various velocities. According to H. W. Schmidt there are a certain number of groups, each homogeneous in itself (Ann. der Phys., Nov., 1906). It is conceivable that the effect of varying the atomic weight of the radiator might depend on the velocity of the β particle, and that the smaller atomic weights might return a relatively small amount of fast primary rays. Assuming the velocity of the secondary rays to be of the order of that of the primary, it would then follow that the constitution of a heterogeneous primary beam would be altered by scattering, the alteration depending on the atomic weight of the scattering substance or radiator, and being of the nature indicated by experiment. Crowther (Phil. Mag., Oct., 1906) has described an experiment which appears to show a considerable effect of this kind. He found that the secondary ionisation due to the β rays of UrX was much more nearly proportional to atomic weight than in the case of radium, as studied by McClelland, and he has suggested that the difference "may be due to the presence in the radium radiation of comparatively slowly-moving β rays." On the other hand, H. W. Schmidt has recently found (Ann. der Phys. Bd., 23, 1907) that the behaviour of substances under radiation from the β rays of UrX is not very different to that found by McClelland in the case of radium. As it was important to settle this point, if we were to find the true interpretation of our own experiments, we put together the apparatus of the form used by Crowther, and repeated his experiments with UrX, using also radium and actinium. The apparatus is not very well suited, as Schmidt points out, for obtaining accurately the proportion between secondary and primary; but it gives a ready answer to the question as to whether or no the speed of the β particle has any effect.

Subtracting the effects of the carbon plate from all the others, and setting lead equal to 200, we obtained the following results:—

	Pb.	Sn.	Ag.	Zn.	Cu.	Fe.	Al.	C.
Ac.	200	158	147	110	102	91	37	0
UrX... ...	200	160	147	110	102	87·5	36	0
Ra. 1. ...	200	155	145	106·5	99·5	86·5	34·5	0
Ra. 2. ...	200	152·5	141	101·5	94·5	79	31	0
Ra. 3. ...	200	152	145	99	82	68	25·5	0
Ra. 4. ...	200	132·5	123	88	82·5	73	27·5	0

The screens used were as follows:—

Ac—Thin mica + thin tinfoil; the two equivalent to about 10 cm. of air, and enough to cut off all α rays.

UrX—No screen.

Ra 1—Thin mica + tinfoil, the latter ·00366 cm. thick.

Ra 2—Thin mica + tinfoil, the latter ·0293 cm. thick.

Ra 3—Thin mica + tinfoil, the latter ·0586 cm. thick.

Ra 4—Thin mica + lead, the latter equivalent to ·11 cm. of tinfoil.

The figures for Ra 1, Ra 2, Ra 3, are for β rays only, the effects of γ rays having been eliminated. The figures for Ra 4 have not been corrected for γ rays, and must, indeed, refer almost entirely to rays of the latter class.

The velocity of the β rays of Ac is less than in the case of UrX. In the case of radium it varies; some of the rays are as little penetrating as those of Ac, others more than the rays of UrX. The figures seem to show that there is a certain small dependence on the velocity of the β rays, but it is insufficient to account for the variations in quality which have been described above.

We must therefore fall back upon a second explanation, viz., that the scattered rays possess velocities which are less, on the average, than those of the primary; and that the difference is greater in the case of the atoms of small atomic weight. This is in general accordance with other experiments and with expectation. It has been shown by Gehrcke (Ann. der Phys., viii., p. 81, 1902) that scattered cathode rays possess a variety of velocities, none greater than that of the primary, some, however, being equal to it. And it is not unreasonable to suppose that β rays lose more energy in being scattered by atoms of less weight or of looser building than by those which are heavier or more rigid. If, therefore, a homogeneous beam of β rays fell upon an aluminium plate, there would be found in the scattered secondary rays a larger proportion of particles of much reduced speed than if the plate had been lead.

When we measure the ionisation produced in an ionisation chamber, and insert successive thicknesses of absorbing material between the radiating substance and the chamber, placing them in contact with the wall of the latter, the effect is the same as if we gradually removed the chamber to greater distances; if we may assume that the law of absorption in air and in the given absorbing material is not greatly affected by the alterations in quality which we are considering. We may, therefore, take the figures in any vertical column of the first table given above as showing the effects of the secondary radiation at various distances from the radiator. If we plot an ionisation-distance curve the whole area between the curve and the axes is the true measure of the ionisation due to the returned rays. The usual plan is to accept as a measure the one figure at the head of the column.

We find that in each case the curve may be nearly expressed as the sum of two exponentials as $Ae^{-\lambda_1 x} + Be^{-\lambda_2 x}$. Whether this has a physical meaning or not does not concern our immediate argument. Commencing with one thickness of tinfoil on the dome, the actual figures are—

I.	II.	III.	IV.
Pb ...	$564e^{-60x} + 560e^{-13\cdot6x}$	200	200
Ag ...	$492e^{-57x} + 337e^{-14x}$	125	140
Zn ...	$409e^{-57x} + 218e^{-14x}$	83	98·5
Fe ...	$365e^{-54x} + 154e^{-14x}$	61·5	76·5
S ...	$264e^{-59x} + 78e^{-13\cdot5x}$	35	43
Al ...	$218e^{-73x} + 58e^{-14x}$	19·5	27·5
C ...	$117e^{-73x} + 23e^{-14x}$	0	0

The area of the curve is given by $A/\lambda_1 + B/\lambda_2$, and the relative values of the areas are placed in the third column, that of C being first subtracted and that of Pb being set equal to 200. In the last column are the corresponding figures when the amount of radiation is measured by A + B, *i.e.*, the ionisation found when one layer of tinfoil is placed over the chamber. It is clear that there is a considerable difference.

When tinfoil is placed over the radium itself so as to cut out a large proportion of the slower β rays, the secondary radiation is also hardened correspondingly.

The figures here given are not sufficiently accurate to be taken as absolute. The measurements were made as carefully as possible, but more numerous and more varied experiments are needed before it will be possible to map out the phenomena with exactness. But the results show clearly that—

(1) The secondary radiation from different substances, due to the β and γ rays of radium, varies in quality, those of lower atomic weight returning a greater proportion of less penetrating rays.

(2) When the less penetrating portion of a primary beam of β rays from radium is sorted out, the secondary rays also become more penetrating.

(3) In view of these considerations the ionisation current due to secondary radiation, measured in a chamber of the ordinary form, does not give a simple or accurate determination of the nature of that radiation.

Notes on South Australian Marine Mollusca, with Descriptions of New Species.—Part VII.

By Jos. C Verco, M.D., Lond., F.R.C.S., Eng., Etc.

Plate XXIX.

[Read September 3, 1907.]

Cyclostrema homalon, n. sp. Pl. xxix., figs. 3, 4.

Shell small, thin, flatly depressed, of 4½ whorls. Apical whorls convex smooth. Spire whorls flat excavately sloping towards the upper suture, rounded towards the lower, with a spiral near the upper suture, which is well adpressed so as to simulate another spiral, and two near the lower suture. Body whorl large, with about seven spirals, the lowest forming a basal carina, starting where the inner lip joins the body whorl at its base, and ending at the outer third of the basal lip. Umbilicus large and perspective, with about ten spiral liræ. There is a smooth area between the outermost and the basal carina. The aperture is quadrate, with rounded angles, and lies in an oblique vertical plane. The labrum is excavated at a little distance from the suture, then projects curvedly forwards, and then continuously retrocedes. The inner lip is applied to the base, so that the aperture is not quite circular or complete. Very fine crowded axial microscopic markings, which do not follow the sinuosities of the outer lip.

Dim.—Largest diameter, 2·7 mm.; smallest, 2 mm.; height, 1 mm.

Diagnosis.—*C. harrietta*, Petterd, is closely allied, but has a less open umbilicus, and its labrum is not sinuous on the dorsum, but has a continuous convex curve; and the intra-umbilical spirals are much finer and more crowded.

Variations.—One variety attains a size of 4·1 mm. in diameter, and is more solid. Its aperture is rounder; the umbilicus wider and more perspective, is radially wrinkled, and may not have so many spiral liræ. There may be no spiral lira near the suture on the whorls, nor any elsewhere, or there may be several on the sides of the body-whorl. Some show the basal carina distinctly, others feebly, and others not at all; but the sinuosity of the lip is present and the miscroscopic radial markings.

Locality.—Type, 62 fathoms north-west of Cape Borda; var., 130 fathoms, Cape Jaffa.

Cyclostrema pachyston, n. sp. Pl. xxix., fig. 10.

Shell orbicular, depressed, of five whorls, spire slightly elevated. First two and a half whorls convex, smooth, followed by a spire-whorl, with five equidistant spiral liræ. Body-whorl upper surface flatly sloping, nearly smooth, with fine curved axial wrinkles antecurrent just below the suture, then obliquely retrocedent. Side convex, with four well-marked spiral liræ to the periphery. Base rounded with about eight spiral cords, very flat and low, separated only by incisions. Umbilicus minute, nearly filled up by flat callus expansions of the inner lip, producing rude curved radial wrinkles. Aperture round; outer lip oblique, thin and simple, somewhat crenulated outside by the liræ; basal part thicker and smooth; inner lip thin where applied to the base of the body-whorl, and expanding beyond the concave columella as a thick shiny smooth callus to the centre of the perforation.

Dim.—Greatest diameter, 2·15 mm.; smallest, 2 mm.; height, 1·5 mm.

Locality.—62 fathoms, north-west of Cape Borda, 10 dead.

The largest example is 3·2 mm. in diameter. In the larger shells the perforation becomes more open, and its sides are radially wrinkled.

Cyclostrema denselaminatum, n. sp. Pl. xxix., fig. 9.

Shell opaque-white, minute, turbinate, of four whorls, nearly detached, rapidly increasing. Protoconch one and three-quarter whorls, flatly convex, smooth. Spire-whorls convex. Sutures deep. Aperture circular, complete, detached from the base of the body-whorl; border simple. Umbilicus moderate, perspective. Sculpture begins abruptly from the protoconch; valid axial laminæ, about as high as wide, and one-half or one-third as wide as the interspaces, crowded, nearly 50 in the body-whorl, completely encircling the whorls and so visible in the umbilicus. Fine hair-like spiral threads, about 40 in the body-whorl, less crowded on the base and near the suture than on the periphery.

Dim.—Greatest diameter, 1·55 mm.; smallest, 1·4 mm.; height, 1·1 mm.

Diagnosis.—*Scala nepeanensis*, Gatliff, is more elate and has fewer axial laminæ. *Cyclostrema angeli*, Ten. Woods, is more elate and has a smaller perforation. *C. johnstoni*, Beddome, is similar in shape and has crowded axials, but has no spirals.

Locality.—Type from 62 fathoms, north-west of Cape Borda; Backstairs Passage, 22 fathoms, 6 dead.

Gibbula reedi, n. sp. Pl. xxix., fig. 5.

Shell solid, depressed conoid. Whorls, 4 smooth, flatly convex, slightly hollowed just below the suture. Summit blunt. Suture impressed. Periphery round, barely angulate. Base convex. Umbilicus moderate. Aperture oblique, roundly elliptical; outer lip simple, bevelled inside; a short thin glaze on the base of the whorl; columella arcuate, everted posteriorly, with a tiny notch where it joins the round basal lip at the end of the bordering lira of the umbilicus; throat smooth and iridescent. Sculpture: the dorsum looks as though it were spirally lirate, but is really quite smooth except for very fine miscroscopic curved retrocurrent accremental scratchings. On the base are about a dozen fine spiral incisions, with radial scratch-marks more valid and distant than on the dorsum; these are still stouter and wrinkling within and near the perforation. An inconspicuous lira borders the umbilicus, which has a shallow groove just above it. Colour, chestnut-brown, with dark-brown spiral hair-lines of varying width; dotted with tiny white spots, which, below the suture, are aggregated into small pyramidal blotches with their apex upward, six in the body-whorl. A white band, scalloped on both edges of these aggregated dots, encircles the periphery. An articulated white-and-brown spiral ornaments the lira bordering the umbilicus, a second lies just outside this, and another with more distant double white spots beyond; the rest of the base, which is of a lighter tint than the dorsum, has scattered tiny white dots. The umbilicus is white. Over all is a transparent glaze, with a bronze reflex.

Dim.—Greatest diameter, 6·2 mm.; smallest, 5 mm.; height, 3 mm. The species may reach 7·2 mm.

Locality.—The beach, Holdfast Bay (Tate); Leven's Beach, Yorke Peninsula (Zietz). It seems to be quite littoral. I have not dredged it.

There may be a faint gutter where the labrum joins the body-whorl. The colour may be dark-brown. The peripheral white band may fade out toward the aperture. The white blotches beneath the suture and the articulated bands around the perforation seem the most constant ornament.

It was formerly called in South Australia *Gibbula Fesserula,* Ten. Woods, and was so catalogued as No. 348 in Adcock's Handlist of the Aquatic Moll. of South Australia, 1893, but his species has been recognized as an immature *Diloma Adelaidæ,* Philippi.

It has been named after Mr. Walter Reed, a South Australian collector, who took it on our shores.

Adeorbis kimberi, n. sp. Pl. xxix., figs. 1, 2.

Shell minute, translucent, oval. Whorls $2\frac{1}{4}$. Spire very low. Apex blunt; protoconch half a whorl, its apex buried, smooth, rounded, marked off from the spire-whorl by a scar. Suture impressed, slightly excavate. Periphery sharply carinate. Base very flatly rounded, and pressed flat at the carina. Umbilicus very wide and not defined. Aperture roundly oval, nearly on the basal plane; outer lip uniformly round, simple, thin, pinched into a minute gutter close to the suture; inner lip is a thin glaze over the body-whorl. Columella slightly arcuate, its edge posteriorly expanded and reflected over the umbilicus. Sculpture: crowded fine microscopic curved accremental lines; on the base more valid and fewer, and as radiating curved wrinkles, which faintly crinkle the carina.

Dim.—Greatest diameter, 3·7 mm.; smallest, 2·9 mm.; height, 1·2 mm.

Locality.—Aldinga (Kimber). Dredged in St. Vincent Gulf in about 20 fathoms (Verco).

Diagnosis.—It is allied to *A. angasi*, Adams, but has not the distant tubercles on the carina.

It is named after the collector who found it.

Torcula runcinata, Watson. Pl. xxix., fig. 14.

Turritella runcinata, Watson, Proc. Linn. Soc., Lond., 1881, vol. xv., p. 218; Chall. Zool., 1886, Gasteropoda, vol. xv., p. 475, pl. xxx., fig. 3.

An individual of 38 mm. in length was dredged alive.

The radula is exceedingly small compared with the size of the shell. It has a somewhat quadrate rachidian tooth, finely denticulated, along the edge of its upper border, bent forward at a sharp angle. The single lateral is transversely rhomboidal, about twice as large as the central, and is also finely denticulate along the free edge of its bent-forward upper margin. The two marginals, elbowed about their middle, have a flange projecting from their upper border, and finely dentate. Miss J. Donald, in a paper on "Some Recent Gasteropoda, referred to the Family Turritellidæ, and their Supposed Relationship to the Murchisoniidæ," read January, 1900, and published in Pro. Mal. Soc., London, 1901, p. 47, etc., mentions *T. runcinata*, Watson, among other species of *Turritella*, and from their deep labral sinus suggests their affinity with *Murchisonia*. The Pleurotomariidæ and Murchisoniidæ are regarded as belonging to the Rhipidoglossa. But the radula of *T. runcinata*, Watson, plainly places it among the Tænioglossa, and allies it with the ordinary forms of *Turritella*, rather than with *Murchisonia*. If therefore *Murchi-*

sonia is to be associated with those *Turritellas* which Miss Donald has grouped under a new section, *Colpospira*, because of their deep sinus, this group must still be placed among the Turritellidæ, and *Murchisonia* must be shifted with them into the same family, among the Tænioglossa, and separated from the Pleurotomariidæ and other Rhipidoglossa. But the resemblances in the test of her *Colpospira*, and of *Murchisonia* are scarcely sufficient to justify this.

Actæon roseus, Hedley, *var.* **areatus,** new var.

Actæon roseus, n. sp., Hedley, Proc. Linn. Soc., New South Wales, 1905, p. 535, pl. xxxiii., f. 42. Type locality—Wyargine Point, Middle Harbour, Sydney; also Eden, New South Wales.

Our South Australian shell has a shorter spire and a longer aperture; also two white spiral bands and several undulating axial bands, which break the colour up into oblong blotches. Dredged in 18 fathoms, Investigator Strait; 22 fathoms, Yankalilla Bay; 15 fathoms, off Point Marsden, Kangaroo Island; and 25 fathoms, Thorny Passage, Spencer Gulf; all dead.

Actæon retusus, n. sp. Pl. xxix., fig. 12.

Shell oval, shining, translucent, yellowish-white, thin, of six whorls. Protoconch of one whorl, apex immersed, convex, quite smooth, ending abruptly in an oblique retrocurrent scar. Spire whorls roundly shouldered immediately below the suture, then convexly sloping. Suture deeply narrowly channelled. Body-whorl roundly-obliquely cylindrical. Aperture obliquely-arcuately pyriform. Outer lip simple, smooth inside, finely-crinkled outside, very slightly compressed above its centre; basal lip well-rounded, its inner half distinctly everted. Columella with a wide, simple oblique fold just below the base of the body-whorl, over which the thin inner lip is applied to join the labrum at the suture. Umbilicus small.

Spiral incisions, six in the penultimate, forty in the body-whorl, extending to the columella, where they become crowded and fine. Very delicate, close-set, axial striæ cross the incisions, which they punctate, climb, and crenulate their sides, and traverse the intervening flat spiral bands.

Dim.—Length, 9·4 mm.; breadth, 6·1 mm. Length of aperture, 6·5 mm.; width, 2·9 mm.

Locality.—Type, 200 fathoms, off Beachport, with two other examples; also in 100, 110, and 150 fathoms; off Cape Jaffa in 90 and 130 fathoms; N.W. of Cape Borda in 60 fathoms. In good condition, but none alive.

Diagnosis.—It differs from *A. roseus*, Hedley, var. *areatus*, Verco, in having a much less acute apex, a more elevated spire, narrower incisions, more crowded axial striæ, a less pronounced columellar fold, and the absence of the colour-pattern.

Variations.—One shell is somewhat more ventricose, another more elate, with more valid axial striæ; the former has two faint rusty blotches of colour on the dorsum of the body-whorl, a little below the suture; the latter has the trace of a pinkish tinge.

Pupa intermedia, Angas.

Buccinulus intermedius, Angas, Proc. Zool. Soc., London, 1878, p. 862, pl. liv., f. 11. Type locality, Aldinga.

Adcock, Handlist of Aquatic Moll. of S. Austr., 1893, p. 10, No. 424.

Solidula intermedia, Angas, Pilsbry., Man. Conch, vol. xv., 1893, p. 145, pl. xxa, figs. 55, 56.

It has been dredged dead in Hardwicke Bay, Spencer Gulf, Investigator Strait, St. Vincent Gulf, and Backstairs Passage, at all depths from 14 to 22 fathoms, and at 62 fathoms N.W. of Cape Borda. It has been taken alive at 15 fathoms, Investigator Strait.

It exhibits the following variations:—The middle third of the body-whorl may be slightly concavely compressed. The axial sculpture may vary from microscopic accremental striæ, just punctating the spiral incisions, when these are narrow, or crenulating their edges when wider, up to fairly well-marked oblique striæ, which divide the wide incisions into squarely-rounded shallow pits, and cross the intervening flat riblets. The spiral incisions may be equidistant all over the body-whorl, or absent from the upper half of the body-whorl, or they may be trebly distant here. They may be merely very fine and shallow punctate engravings, or rather wide furrows with crenulated edges, or latticed into squarish pits. But all variations grade into one another.

Pupa hyalina, n. sp. Pl. xxix., fig. 11.

Shell minute, diaphanous, fusiformly oval, five whorls. Protoconch distinct, glassy, smooth. Suture adpressed. Whorls sloping, convex. Aperture narrow, long, and pyriform. Outer lip uniformly curved, simple, thin, continued into a round basal lip, which is thickened towards the columella. The inner lip is a thin glaze over the body-whorl, and is expanded slightly beyond the pillar over the perforation. There is a curve of the columella forming a plait running into the basal lip, and a second well-marked oblique plait where the pillar joins the body-whorl. The spire-whorls have sublenticular wavy spiral incisions, which also cover the body-whorl, being most marked at the base, and nearly as well marked below the suture. Very fine, rather sinuous, accremental striæ. Colourless.

Dim.—Length, 3 mm.; diameter, 1·5 mm.; length of aperture, 2·2 mm.

Locality.—Fowler and Streaky Bays (Tate).

Myodora tasmanica, Tenison Woods.

Myodora Tasmanica, n. sp., Ten. Woods, Proc. Roy. Soc., Tasm., 1875 (1876), p. 160. Type locality—Long Bay, Tasmania. Tate and May, Proc. Linn. Soc. N.S.W., 1901, vol. xxvi., part 3, p. 422, pl. xxvii., figs. 104-106.

Dredged off Beachport in 100 fathoms, 5 valves; in 110 fathoms, 50; in 150 fathoms, 2; and in 200 fathoms, 2 valves. It was not taken in shallower waters off the same place, and has not been taken on the South Australian beaches. It appears not to have been recorded from Victoria nor from New South Wales.

Crassatellites kingicola, Lamarck.

This shell was referred to by me in these Transactions, vol. xxix., 1905, p. 169, as *C. ponderosus*, Gmelin. It appears now that our *C. castanea*, Reeve, should be regarded as a variety of *C. kingicola*, Lamarck.

It has been dredged in a subfossil state in soft limestone in the Port Adelaide Channel. One valve was taken in 40 fathoms, and two in 100 fathoms off Beachport, both small and poor. Hitherto, therefore, its habitat has been very restricted as to depth, viz., from 15 to 20 fathoms.

Crassatellites discus, Hedley.

Crassatellites discus, Hedley, Records Austr. Mus., vi., 1907, p. 300, pl. lvi., figs. 26-27. Type locality, 80 fathoms, off Narrabeen, New South Wales.

None were dredged alive, but valves in good condition were obtained. Off Beachport, at 40 fathoms, 31 valves; at 49 fathoms, 22 valves; at 100 fathoms, 4 valves; at 110 fathoms, 20 valves; at 150 fathoms, 17 valves; and at 200 fathoms, 2 valves. Off Cape Borda, at 55 fathoms, 7 valves; and at 62 fathoms, 5 valves. Off Cape Jaffa, in 130 fathoms, 14 valves. This seems not to occur in the gulfs of South Australia, but to be an ocean form, and to affect the deeper waters.

Crassatellites carnea, Tate.

Crassatella carnea, Tate, Trans. Roy. Soc., S. Austr., vol. xiv., p. 263, pl. xi., f. 1, 1A. Type locality—Yankalilla Bay.

It has been dredged alive at all depths from 9 to 23 fathoms, most abundantly from 20 to 23 fathoms. Valves have been taken, small and in poor condition, off Beachport at 110 and 200 fathoms, and off Cape Jaffa, in 90 fathoms. Comparatively large valves were taken off Beachport in 40 fathoms, the largest being 25 mm. antero-posteriorly, and 20 mm. umbo-ventrally. Tate, in his original diagnosis, remarked: "This species is very like *C. aurora* and *C. Banksii*, Adams and Angas, inhabiting Bass Straits, with regard to colour, ornament, and crenated margin of valves. It is, however, of a different form, is as widely removed from *C. aurora* as that species is from *C. Banksii;* thus, *C. Banksii* is oblong-ovate, *C. aurora* transversely ovate, and *C. carnea* is more rotund. They may eventually prove to be variations in shape of an aggregate species."

The proportion of length to height in *C. aurora* is 24 to 17, or as 100 to 71. That of Tate's type is 22 to 19, or 100 to 86·8. That of my largest is 25 to 20, or 100 to 80. There fore my largest shell approximates somewhat more to the type of *C. aurora* than does Tate's type of *C. carnea*, but is still much shorter; and as my larger shell is larger than Angas's type, and is nevertheless shorter, and is an old stout shell, the difference is not explained by the senility of Angas's shell. *C. carnea* may consequently be retained for the present as a distinct species.

Crassatellites banksii, Adams and Angas, *var. angustior;* n. var.

Crassatella banksii, Adams and Angas, Proc. Zool. Soc., Lond., 1863, p. 427, pl. xxxvii., fig. 16. Type locality—Banks Straits. Conch. Cab. Kuster, 1886, bd. x., abt. i., p. 26, pl. vii., f. 14.

In 55 fathoms north-west of Cape Borda I dredged 16 small and 33 large valves of a species which corresponds with *C. Banksii* in its oblong-ovate shape and truncated posterior end and colouring. Its dimensions, however, do not correspond. It is narrower antero-posteriorly for the same height. *C. banksii* is 16 mm. long by 10 high; mine are 12 mm. long by 10·2 high—hence the name *angustior*. My largest specimen is 23 mm. by 20·5. To be in proportion it should be 32·8 mm. long instead of 23. I have preferred to call it a variety rather than create another species based on this one difference. It has not occurred elsewhere in my dredging.

Crassatellites producta, Verco.

Crassatella producta, n. sp., Trans. Roy. Soc., S. Austr., 1895, vol. xix., p. 92, pl. 1., f. 2.

Fifty valves were dredged off Cape Borda in 55 fathoms, in very good condition. Beyond this depth in the same neighbourhood at 60 and 62 fathoms; off the Neptunes, in 104 fathoms; and off Beachport, in 110 fathoms; from one to six valves in poor preservation were obtained, and none beyond. Its habitat is probably from 15 to 20 fathoms, up to 50.

Crassatellites micra, Verco.

Crasatella micra, Verco., Trans. Roy. Soc., S. Austr., 1895, vol. xix., p. 93, pl. 1, fig. 3.

Previously dredged alive in 20 and 22 fathoms; one has since been taken alive in 16 fathoms, three miles off Tunk Head, and one perfect individual and 11 valves in 62 fathoms north-west of Cape Borda. Valves have been obtained off Beachport, 10 in 49 fathoms, and 12 in 110.

Crassatellites probleema, n. sp. Pl. xxix., figs. 6, 7.

Shell transversely-orbicularly oval, solid, projecting anteriorly. Umbo prominent, incurved, prosogyre, acute. Post-dorsal side roundly sloping; anterior dorsal side concave near the umbo, then nearly straight, continuing into a well-rounded front side; ventral border with a uniform open curve, merging into the slope of the posterior side, with an inconspicuous round angulation. The surface is corrugated with about twenty solid wide concentric ribs, more projecting at their upper border, wider than their interspaces. For about 2·5 mm. from the apex the surface is smooth. Inner border simple and smooth. Colour light horn-tint.

Dim.—Antero-posterior diameter, 10·3 mm.; umbo-ventral, 9·4 mm.; sectional of the two valves, 4·25.

Locality.—Off Beachport, in 100 fathoms, 2 valves; 150 fathoms, 14 valves.

Diagnosis.—In shape it is very like *C. micra*, Verco; but this is a much smaller shell, with an equal number of concentric ribs, and these extend quite up to the apex. It closely approaches *C. discus*, Hedley, in the smooth area near the umbo, and in the marked concentric ribbing, but has the front much more produced, and the postero-lateral area not flat or truncated at the border.

Variations.—In some the angle at the umbo is more acute and in others less than in the type, so that the shell is proportionally narrower or wider. In some, especially the wider ones, there is a tendency to slight truncation in the posterior part of the ventral border.

Lima multicostata, Sowerby.

Lima multicostata, Sowerby, Thes. Conch., 1847, vol. 1, p. 85, sp. 6, pl. xxii., f. 38. Type locality—"Mediterranean (?)" Reeve's Conch. Icon., 1872, vol. xviii., pl. 1, f. 4; E. A. Smith, Chall. Rep., Zool., vol. xiii., 1885, p. 288; Tate, Trans. Proc. Roy. Soc., S. Austr., 1886, vol. ix., p. 108; Tate and May, Proc. Linn. Soc., N. S. Wales, 1901, vol. xxvi., part 3, p. 440; Pritchard and Gatliff, Roy. Soc., Vict., 1904, vol. xvii., (N.S.), part 1, p. 259.

Radula lima, Linné, Angas, Proc. Zool. Soc., Lond., 1865, p. 656, No. 91; Ten. Woods, Proc. Roy. Soc., Tasm., 1878, p. 56.

Lima lima, Linn, *var. multicostata*, Sowerby, Hedley, Mem. Austr. Mus., vol. iv., 1902, p. 309.

Dredged alive at all depths, from 9 to 30 fathoms; embedded in sponge or attached inside dead *Pinna inermis*, etc. Off Beachport and Cape Jaffa, valves only, at 49, 110, 130, and 200 fathoms. One specimen, at 110 fathoms, off Beachport, has 45 ribs; usually they have from 25 to 30.

Lima bullata, Born.

Ostrea bullata, Born., Mus. Caes. Vindobon, 1780, p. 110, pl. vi., f. 8; Dillwyn, Desc. Cat., 1817, p. 270.

Lima bullata, Born., Sowerby, Thes. Conch., 1843, vol. i., p. 84, pl. xx., f. 32, 33; Hanley, Cat. Rec. Bivalve. Shells, 1843, p. 266; Sowerby in Reeve's, Conch. Icon., 1872, vol. xviii., p. 1, f. 3 *a* and *b;* Tate, Trans. Roy. Soc., S. Austr., 1886, vol. ix., p. 109, No. 162; Adcock, Handlist Aquatic Moll., S. Austr., 1893, p. 14, No. 202; Hedley, Mem. Austr. Mus., vol. iv., part 5, 1902, p. 310.

Radula (Limatula) bullata, Born., Angas, Proc. Zool. Soc., Lond., 1865, p. 656, No. 93.

Lima (Limatula) bullata, Born., Tryon, Struct. and Syst. Conch., 1884, vol. iii., p. 287, pl. 132, f. 93; E. A. Smith, Chall. Zool., 1885, vol. xiii., p. 292; Tate and May, Proc. Linn. Soc., N.S. Wales, 1901, vol. xxvi., part 3, p. 440; Pritchard and Gatliff, Proc. Roy. Soc., Vict., 1904, vol. xvii. (N.S.), part 1, p. 260.

Lima strangei, Sowerby, in Reeve's Conch. Icon., 1872, vol. xviii., pl. 1, f. 3*a*, *b*.

Dredged alive at Port Lincoln in 9 fathoms, 1 very small; in Backstairs Passage in 18 fathoms, 1, and in 20 fathoms, 4, so that it is very rare in deep water. Valves have been taken off Beachport, Cape Jaffa, and off the Neptune Islands at 40, 60, 90, 100, 150, and 200 fathoms, generally in poor condition, especially the larger examples.

Lima angulata, Sowerby.

Lima angulata, Sowerby, Thes. Conch., 1843, vol. i., p. 86, pl. xxii., f. 39 and 4. *Type locality.*—Panama and Bay of Caraccas, 10 to 12 fathoms. Sowerby, in Reeve's Conch. Icon., 1872, vol. xviii., pl. iii., f. 13; Tate, Trans. Roy. Soc., S. Austr., 1886, vol. ix., p. 109; Adcock's Handlist, 1893, p. 14, No. 201; Hedley, Mem. Austr. Mus., 1902, vol. iv., p. 310.

Radula (Mantellum) angulata, Sowerby, sp. Angas, Proc. Zool. Soc., Lond., 1865, p. 656, No. 92.

In Hardwicke Bay, Spencer Gulf, they occur in enormous numbers, from near shore to fifteen miles out, forming nests of small shells and fragments of shell in dead *Cardium* valves, etc., in about 15 fathoms. They have also been dredged at all depths from 9 to 24 fathoms, alive, throughout Spencer and St. Vincent Gulfs and Backstairs Passage. Off Beachport 4 well-preserved valves were taken in 110 fathoms, and 5 in 200 fathoms. It appears not to have been secured in Victoria or Tasmania, though taken off the coast of New South Wales in 50 and 75 fathoms, as valves.

Limæa murrayi, Smith.

Lima murrayi, Smith, Proc. Zool. Soc., Lond., 1891, p. 444, pl. xxxv., f. 26.

Limæa murrayi, Smith, Hedley, Records Austr. Mus., vol. vi., part 3, 1906, p. 223.

L. acclinis, Hedley, Records Austr. Mus., vol. vi., part 2, 1905, p. 46, f. 10. *Type locality.*—100 fathoms off Wollongong, also 300 fathoms east of Sydney Heads, N.S. Wales.

Dredged, separate valves, off Beachport, in 100, 110, 150, 200 fathoms; off Cape Jaffa in 130 and 300 fathoms; and in 104 fathoms, 35 miles south-west of Neptune Islands.

Limæa austrina, Tate.

Limæa austrina, Tate, Trans. Proc. Roy Soc., S. Austr., vol. ix., 1886, p. 73, pl. iv., f. 7.

This is a common shell in deeper water. It has been dredged alive, at all depths, from 15 to 22 fathoms in Investigator Strait, Backstairs Passage, and off Newland Head; 1 in 8 fathoms, Eastern Cove, Kangaroo Island; and 1 in 49 fathoms, Beachport. It seems to be most abundant about 20 fathoms. Valves have been obtained in Spencer and St. Vincent Gulfs; as far east as Beachport, where it has been taken at 40 and 49 fathoms in numbers, and good; at 100, 150, and 200 few and poor; and as far west as Cape Borda and the Neptunes, in 45 and 55 fathoms.

EXPLANATION OF PLATE XXIX.

1. *Adeorbis kimberi*, Verco, ventral view.
2. ,, ,, ,, side view.
3. *Cyclostrema homalon*, Verco, dorsal view.
4. ,, ,, ,, side view.
5. *Gibbula reedi*, Verco.
6. *Crassatellites probleema*, Verco, exterior.
7. ,, ,, ,, interior.
8. *Leptothyra carinata*, Verco.
9. *Cyclostrema denselaminatum*, Verco.
10. ,, *pachyston*, Verco.
11. *Pupa hyalina*, Verco.
12. *Acteon retusus*, Verco.
13. *Arculara dipsacoides*, Hedley, radula.
14. *Torcula runcinata*, Watson, radula: A., rachidian; B., lateral; C.D., marginals.

ABSTRACT OF PROCEEDINGS

OF THE

Royal Society of South Australia

(Incorporated)

FOR 1906-7.

ORDINARY MEETING, NOVEMBER 6, 1906.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.), in the chair.

PAPERS.—"The Phosphate Minerals from Elder Rock," by DOUGLAS MAWSON, B.E., B.Sc., and W. T. COOKE, D.Sc. "Geological Features of Part of Eyre Peninsula," by DOUGLAS MAWSON, B.E., B.Sc. "The Wadella Springs and Associated Bog Iron-ore Deposits," by the same author. Mr. Howchin apologized for the absence of Mr. Mawson, and read the papers contributed by the latter.

ORDINARY MEETING, MAY 7, 1907.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.), in the chair.

NOMINATIONS.—R. F. Purdue, Mining Agent, Launceston, Tasmania; H. C. E. Muecke, Agent, Adelaide; John Darling, Corn Merchant, Adelaide; Professor R. W. Chapman, M.A., B.C.E., Adelaide University; W. T. Cooke, D.Sc., Adelaide University.

EXHIBITS.—J. G. O. TEPPER, F.L.S., a caterpillar fungus from Davenport, England. This fungus (*Sphæria militaris*) is of a bright-scarlet colour and erect growth. It would appear that, owing to the caterpillar burying itself in the soil preparatory for its pupa state, the spores of the fungus very readily find their way into the creature's body, which becomes filled with the mycelium of the plant. Mr. W. HOWCHIN, F.G.S., exhibited a piece of barbed wire from a fence at Blackfellows' Creek which had been struck by lightning. The lightning had run along the fence for 5 or 6 panels, fusing the surfaces of the wires and welding together some of the barbs. Leaving the fence the charge struck a tree about a chain away, splitting the butt and tearing up the ground around. The PRESIDENT exhibited a fulgurite or lightning-tube. The portion shown was 18 centimetres (about 7 inches) long and 33 millimetres (about $1\frac{1}{3}$ inches) in diameter. The wall of the tube was about 1·5 to 2 millimetres in thickness, and was composed of fused sand, smoothed and glazed on the inner surface, rough like sandpaper outside, and longitudinally folded in about seven nodose corrugations. It was very brittle. This fulgurite was given to Dr. Verco by Mr. Whitton, of Warrina, near Oodnadatta, who supplied the following particulars:—At the end of November, 1902, a severe thunderstorm passed over the district, and a tremendous explosive report was heard, attended by a marked vibration of the ground. The next day a black boy found, about three-quarters of a mile from the station, a stunted mulga-tree, one of whose branches was split and charred, and immediately below was a depression in the sand. Groping in this he found a piece of sand tube, and took it to the station. Mr. Whitton visited the spot and followed the tube down for about 12 feet, beyond which he could not go, because the sand rolled in as fast as he threw it out. The tube stood in almost a vertical position, and varied but little in diameter and in the thickness of its walls. These curious tubes, produced by lightning, are not uncommon in New South Wales, and are found, Mr. Mawson stated, in the high peaks of Mexico and in the Pacific islands, and on Mount Ararat they have been found to penetrate the Andesite rocks. Mr. A. H. C. Zietz, F.L.S., Assistant-Director of the Museum, showed bones of kangaroos and the extinct "pouched lion" *(Thylacoleo carnifex)*, found by Mr. Zietz and his son at Salt Creek, Normanville. The kangaroo bones were very clearly marked by the sharp-cutting teeth of the marsupial "lion." Mr. Zietz also exhibited varieties of goldfish *(Carassius auratus)*. These fish vary much in size, colour, and general appearance. Specimens have been obtained from the Murray and Torrens Rivers over a pound each in weight. The dark variety is numerous in both rivers. Those received in the Museum lately were killed by the influx of saltwater into the Murray. About a dozen varieties have been described.

Papers.—"A New Species of Microtis" *(M. orbicularis*, nov. sp.), by R. S. Rogers, M.A., M.D. "Notes on South Australian Marine Mollusca, with Descriptions of New Species," Part v., by J. C. Verco, M.D., F.R.C.S. "Mineral Notes," by Douglas Mawson, B.E., B.Sc. "New Australian Lepidoptera," by Oswald B. Lower, F.E.S. "A Comparison of the Various Types of Electric Radiation," by Professor W. H. Bragg, M.A., F.R.S.

Professor E. H. Rennie, D.Sc., and The President referred to Professor Bragg's scientific investigation of radiant matter, and congratulated him upon the distinction conferred by the Royal Society of London, in electing him as a Fellow.

Ordinary Meeting, June 4, 1907.

The President (J. C. Verco, M.D., F.R.C.S.) in the chair.

Nominations.—John McConnell Black, Pressman, and R. H. Pulleine, M.B., C.M., both of Adelaide, as Fellows.

Ballot.—Rudolph Fison Purdue, Mining Agent, Tasmania; Hugo Carl Emil Muecke, Agent, and John Darling, Corn Merchant, both of Adelaide; and Professor R. W. Chapman, M.A., B.C.E., and W. T. Cooke, D.Sc., both of Adelaide University, were unanimously elected as Fellows.

Exhibits.—J. G. O. Tepper, F.L.S., exhibited two cases of Australian micro-moths, which, with ten other cases in the Museum, were collected by the late W. Guest, and re-arranged by Mr. Tepper; only about 2 per cent. of these are destructive or injurious in the garden and field. The *Cryptophaga impunctata* is very injurious to cultivated trees. Mr. Tepper also exhibited the contents of the crop of a black magpie, sent to him by Mr. J. W. Mellor, containing the remains of two species of insects, not generally eaten by birds; one of these a bug belonging to the same family as the bed-bug, and some berries, possibly from one of the *Styphelias*. Mr. Tepper also showed a cockroach (*Ataxigamia* sp.) from Kalgoorlie (very similar to the warehouse insect) from Mr. Ashby. Mr. W. B. Poole exhibited a number of photo-micrographs of diatoms and transverse sections of the stems of plants, highly magnified. Mr. E. Ashby, a very handsome cock lyre-bird, from the Maconolly Ranges, and the skins of a megapode and young, from Northern Australia. Judging from the appearance of the country where the lyre-bird was found, Mr. Ashby thinks that these birds would thrive in the hills around Adelaide and on Kangaroo Island. He also mentioned instances of mimicry by lyre-birds. Mr. Ashby gave some further notes on the mound-building megapodes of Northern Australia, from information given by Mr. C. E. May, of Port Keats, who examined four nests of these birds in that neighbourhood. These nests were all slightly flattened on the tops, and more or less covered with small brushwood, which, it appears, had been thrown up by the birds themselves. This brushwood prevents the earth, of which the mounds are composed, from setting too hard. The flattening of the top is possibly caused by the natives digging for the eggs and in so doing pulling the top down. The megapode always selects a thick jungle amongst tamarind-trees for its mound. Many of these tamarinds are, perhaps, 100 years old, and in some cases they grow out of the nests or mounds. These nests, evidently of considerable age, are used year after year by many generations of egg-laying megapodes. Each season the bird scratches and tunnels to a depth of from 2 to 5 feet into the old nest, at an angle of about 45 degrees, and lays 5 or 6 eggs, each one being placed 2 or 3 feet from its neighbour. There are reasons for thinking that these tunnels are used year after year, but this has yet to be proved. In nest No. 2, the dimensions of which are given below, the tunnel had been filled in with green leaves; a trail 60 feet long led up to where the newly-laid eggs had been placed.

Measurements of four Mound Nests:—

	Diameter of Base.	Circumference.	Height of Mound.		Diameter of Top.
	ft.	ft.	ft.	in.	ft.
No. 1 ...	53	167	8	0	17
No. 2 ...	46	147	7	7	12
No. 3 ...	33	105	5	9	12
No. 4 ...	42	132	7	6	12

From these measurements it appears that a close similarity exists in the size and shape of the nests. No 1, the largest mound, is probably the oldest.

Ordinary Meeting, July 2, 1907.

The President (J. C. Verco, M.D., F.R.C.S.) in the chair.

Ballot.—John McConnell Black and R. H. Pulleine, M.B., C.M., were elected as Fellows.

New Premises.—The President congratulated the Society upon meeting in its new room, and expressed a hope that the Government would erect some shelving for the library.

Obituary.—The President referred to the death of Mr. John Dennant, F.G.S., one of the Honorary Fellows, who had been connected with the Society since 1888, and had contributed to its Transactions several geological papers, and a series of papers on corals, which his death leaves incomplete.

Exhibits.—Mr. Zietz, F.L.S., C.A.Z.S., exhibited birds' skins from various parts of Australia, including thickheads, finches, honey-eaters, and wrens.

Mr. J. G. O. Tepper, F.L.S., (1) a stone-making fungus, *Laccocophalum*, McAlp. et Tepp.; (2) galls on apple-tree roots, showing mode of propagation of woolly aphis; (3) some rare specimens of *Buprestidæ* and *Cetonidæ;* (4) first specimen of fruit-fly *(Tephritis musæ)* found in South Australia, which was picked up dead on a gravel path in Adelaide.

Dr. Morgan exhibited—(1) Pelvis, sternum, and shoulder-girdle of the lyrebird, and similar bones of the magpie and parrot for comparison; (2) syrinx or vocal organ of lyrebird; (3) contents of stomach of same, consisting of beetles, spiders, caterpillars, and small stones.

Dr. Pulleine, M.B., C.M., the male of the common trapdoor spider.

The President exhibited a pair of fins of a fish attributed by Mr. Zietz to the butterfly gurnard, not the flying gurnard; (2) a cuttlebone of an apparently new species resembling somewhat the *Sepia elongata* of the Red Sea; (3) a crab which had lost its left claw at the second articulation, showing a capsule springing from the joint, containing the embryo of the whole of the missing parts.

Papers.—The following papers were laid on the table:—"Notes on South Australian Decapod Crustacea," Part v., by W. H. Baker. "New Australian Lepidoptera, with Synonymic Notes," No. xx., by Oswald B. Lower. "Descriptions of Australian Curculionidæ, with Notes on Previously-described Species," Part v., by Arthur M. Lea, Government Entomologist, Tasmania.

Ordinary Meeting, August 6, 1907.

The President (J. C. Verco, M.D., F.R.C.S.) in the chair.

Nomination.—Robert Thomson Melrose, of Mount Pleasant, as a Fellow.

Dr. Pulleine, referring to the proposal to transfer the classified collection of plants in the Botanic Gardens to the experimental area, expressed his fear that in so doing many valuable Australian shrubs now growing in the classified borders might be destroyed. For this reason, and also that a properly-classified garden for the study of botany might be secured, Dr. Pulleine proposed—"That in the opinion of this Society the classified garden in the Botanic Gardens should not be abolished, but preserved in its present site, and as far as possible the natural orders and species should be represented by Australian plants"; seconded by Mr. Black, and carried.

It was further proposed by Mr. S. Dixon, seconded by Mr. Howchin, and carried—"That a copy of the above resolution be forwarded to the Chairman of the Board of Governors of the Botanic Gardens."

Dr. Pulleine was requested to interview Mr. Holtze, the Director of the Gardens, in reference to this matter.

PAPERS.—The following papers were laid on the table:—"Revision of the Australian *Psychidæ*," by EDWARD MEYRICK, B.A., F.L.S., and OSWALD B. LOWER, F.E.S., Lond. "Notes on South Australian Marine Mollusca, with Description of New Species," Part vi., by J. C. VERCO, M.D., F.R.C.S. Dr. Verco exhibited specimens of shells—mostly of small size—obtained from deep dredgings off Cape Jaffa, Beachport, and outside the Neptunes, and enlarged drawings of some of the more interesting of these shells by Dr. Pulleine. Dr. Verco gave some interesting extracts from the paper.

MR. HOWCHIN thanked the President for the information he had given them, and directed the attention of the meeting to two points of considerable importance brought out by these studies of shells—first, the reduction in the number of species, by comparing the specimens obtained from various localities, which proved them to be synonymic; and in the second place the light they may throw on the age of geological formations, particularly the age of the various members of the Cainozoic series.

ORDINARY MEETING, SEPTEMBER 3, 1907.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.) in the chair.

NOMINATIONS.—Noel A. Webb, barrister, of Adelaide, and H. A. Sweetapple, medical practitioner, of Parkside, as Fellows, and Herbert Basedow, science student, at present in Germany, as a Corresponding Member.

BALLOT.—Robert Thomson Melrose, of Mount Pleasant, sheepfarmer, was elected a Fellow.

AUDITORS.—J. S. Lloyd, F.I.A., S.A., and Stirling Smeaton, B.A., C.E., were elected Auditors.

EXHIBITS.—A. H. C. ZIETZ, F.L.S., exhibited a dark concretion of tubular form similar to the sandpipes which form round roots in sandy districts. The specimen, sent by Mr. R. F. Purdue, was found in the tindrifts at Gladstone, Tasmania, close to Purdue's tinmines (alluvial), forty feet from the surface. W. H. SELWAY, an *Acianthus caudatus*, from near the Square Waterhole. J. McC. BLACK, a *Sprengelia incarnata* of peculiar form from the same district.

PAPERS.—R. S. ROGERS, M.A., M.D., read a note descriptive of a new species of Orchid, *Caladenia tutelata*. "Notes on South Australian Marine Mollusca, with Description of New Species," Part vii., by J. C. VERCO, M.D., F.R.C.S.

THE ANNUAL MEETING, OCTOBER 1, 1907.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.) in the chair.

Ballot.—Dr. H. A. Sweetapple and Noel A. Webb, solicitor, both of Adelaide, were elected Fellows. Herbert Basedow, science student, during his absence from Adelaide, was elected a Corresponding Member.

The Annual Report and Balance-sheet were read and adopted.

Election of Officers.—J. C. Verco, M.D., F.R.C.S., was elected President; Prof. E. H. Rennie, M.A., D.Sc., and Rev. Thomas Blackburn, B.A., Vice-Presidents; Walter Rutt, C.E., Honorary Treasurer; Samuel Dixon and W. H. Selway, the retiring members of Council, were re-elected, and Dr. R. S. Rogers, M.A., was elected a member of Council in the place of Dr. Cleland, who had resigned.

J. S. Lloyd, F.I.A., S.A., and Stirling Smeaton, B.A., were elected Auditors for the ensuing year.

Exhibits.—Mr. J. McC. Black, a specimen of *Helichrysum tepperi*, a rare and graceful Composita, which has been found in Morialta Gully and at Mulgundawa and Dublin. Its close relation to *Podolepis sessoni* and *P. siemssenia* were pointed out, and it was suggested that it should rather be placed among the genus *Podolepis* than in that of *Helichrysum*.

The following notice of motion was given by Dr. Rogers:—"That the Government be asked to provide funds for the appointment of a Government Botanist, with the special object of obtaining an expert knowledge of the endemic vegetation of this State for economic purposes."

Papers.—"The Secondary Radiation due to Beta Rays," by Prof. W. H Bragg, M.A., F.R.S., and J. P. V. Madsen, B.Sc. "*Diuris parachila* (sp. nov.), et *Caladenia gladiolata* (sp. nov.)," by R. S. Rogers, M.A., M.D. "Further Notes on Australian Coleoptera, with Descriptions of New Genera and Species" (xxxvii.), by Rev. Thos. Blackburn, B.A.

ANNUAL REPORT, 1906-7.

The Council of the Society is pleased to report a successful year's work. This is evidenced by the papers and exhibits brought before the Society. It would appear, too, that increasing interest is being taken in its work by the public, a fair number of whom attend the monthly meetings as visitors.

Ten members have been elected, a larger number than for some years past.

The membership of the Society consists at the present time of 9 Honorary Fellows, 73 Fellows, 4 Corresponding Members, and 2 Associates.

Resignations have been received on the plea of inability to attend the meetings. It may be pointed out that every member of the Society is directly aiding scientific research, whether or not he attends meetings.

Requests for the Society's publications are constantly being made by scientific societies in Europe and America, and so every year the list of exchanges is increasing, and the library getting larger and becoming more valuable to those interested in scientific work.

The additions to the Institute Buildings were completed in June last, and declared open at an entertainment given by the Board of Governors of the Public Library, etc., on the 12th of that month. At this function it was announced that the large western room on the ground floor (in which this meeting is now being held) was granted to the Royal Society. Since then the allocation has been officially made by the Board.

It is anticipated that the Government will furnish the room with a complete set of shelves for the accommodation of the library.

If it can be arranged it is proposed that the work of Secretary and Librarian shall be made the work of one person, who shall be paid for his services, and who shall act in these capacities for both this and for the Royal Geographical Society.

The obituary for the year includes the names of two life members, the Hon. David Murray, who joined the Society in 1859, and Ebenezer Cooke, the late Commissioner of Audit, also H. C. Russell, an Hon. Member, and late Government Astronomer of New South Wales; David Fleming, Fellow, and some time Chairman of the Microscopical Section, and John Dennant, F.G.S., an Honorary Fellow, who died on June 13 of this year.

Mr. Dennant, a resident of Victoria, was elected in December, 1888, and for nearly thirty years has been an active member of the Society. His first contribution appeared in the Transactions of the Society in October, 1888, in a paper entitled "Notes on the Muddy Creek Beds, with Brief Remarks on other Tertiary Strata of South-Western Victoria." Some years later Mr. Dennant was associated with Professor Tate in compiling three papers on "The Correlation of the Marine Tertiaries of Australia." The interest each had in this work naturally drew Dennant and Tate together, and thenceforward they became friends and fellow workers until the death of the latter. Subsequently Mr. Dennant made a special study of the fossil corals, resulting in the communication of seven consecutive papers on "Descriptions of New Species of Corals from the Australian Tertiaries," illustrated by well-executed plates. This work led up to an examination of recent corals, on which he contributed two papers, "Recent Corals from the South Australian and Victorian Coasts," and on "Madreporaria from the Australian and New Zealand Coasts." Mr. Dennant was regarded as an authority in Australasia in this department of science. Corals dredged in deep water off the coast of New South Wales by Messrs. Hedley and Peters, off the New Zealand coast by Mr. H. Sutuer, and off the South Australian coast by Dr. Verco, were forwarded to him for examination. His removal will be a loss to science. It is hoped some other member will be found to continue the work Mr. Dennant was doing so well. A letter of sympathy and condolence was sent by the Council to Mrs. Dennant.

The resignation of Dr. W. L. Cleland as a member of Council has been received with great regret. Dr. Cleland was elected a Fellow in 1879, and has been on the Council for twenty-four years, for fourteen of which he acted as Secretary, and for three years was President.

THE TREASURER IN ACCOUNT WITH THE ROYAL SOCIETY OF SOUTH AUSTRALIA (INCORPORATED)

Dr	£ s. d.	£ s. d.
October 1st, 1906.		
To Balance		263 11 3
,, Subscriptions—		
Royal Society	77 3 0	
Field Naturalists' Section ...	25 0 0	
Malacological Section	2 5 0	
Microscopical Section ...	8 17 6	
		113 5 6
,, Donation—		
Dr. Verco, to illustrate "Transactions"		26 16 0
,, Government Grants—		
On Subscriptions	83 16 8	
For Printing Reports upon Scientific Investigations in South Australia	150 0 0	
		233 16 8
,, Sale of "Transactions"		1 0 6
,, Bank Interest		7 10 11
		£646 0 10

Cr.	£ s. d.	£ s. d.
By "Transactions"—		
Printing	196 1 6	
Illustrating	55 9 6	
Publishing	17 17 9	
Indexing	10 0 0	
		279 8 9
,, Grants—		
Field Naturalists' Section ...	12 0 0	
Microscopical Section ...	9 0 0	
		21 0 0
,, Library—		
Cataloguing	7 17 6	
Carriage on Books	0 8 6	
		8 6 0
,, Wages—		
Caretaker	3 0 0	
Moving Furniture	3 15 8	
		6 15 8
,, Printing, Postage, and Stationery		7 9 1
,, Exchange on Cheques		0 1 6
,, Conversazione		2 5 6
,, Advertising		2 18 0
,, Balance in Savings Bank ...		317 16 4
		£646 0 10

Walter Rutt, Treasurer.

Adelaide, October 1st, 1907.

Audited and found correct,

J. S. Lloyd, }
S. Smeaton, } Auditors.

DONATIONS TO THE LIBRARY

For Year 1906-7.

TRANSACTIONS, JOURNALS, REPORTS, ETC.

Presented by the respective Editors, Societies, and Governments.

Austria and Germany.

Berlin—Königl. Preuss. Meteor. Instituts, Veröffentlichungen der Ergebnisse des; Niederschlagsbeobachtungen, 1903; Bericht für 1906.

——— Königl. Preuss. Akademie der Wissenschaften zu Berlin, Sitzungsberichte, 1906, Nos. 39-53; 1907, Nos. 1-38.

——— Deutsches Meteorologisches Jahrbuch, 1905, Heft 1, 2. Gesellschaft für Erkunde, Zeitschrift der, 1906, Nos. 7-10; 1907, Nos. 1-6.

——— Berliner Gesellschaft für Anthrop., Ethnol. und Urgeschichte. Ergänzungsblätter zur Zeitschrift für Ethnologie, Jahrgang 38, Heft. 4-6; Jahrgang 39, Heft 1-3.

——— Deutsche Entomologische Zeitschrift, 1881, Heft 1, 2; and each year to 1906; 1907, Heft 1-4.

——— Inhaltsverzeichniss, 1881-99, Catalog der Coleopteren von Sibirien, 1880-81, 1893, 1899.

——— Deutsche Entomologische Gesellschaft—An Account of Professor Dr. Gustav Kraatz, founder of the above Society.

——— Deutsch Südwestafrika und British Bechuanaland, Report for Year 1906.

Freiburg—Naturforschenden Gesellschaft zu Freiburg, Berichte der, Band xli.

Giessen—Oberhessischen Gesellschaft für Natur-Heilkunde, Berichte der, Band i. (1904-6), Band ii.

Göttingen—Königl. Gesellschaft der Wissenschaften zu Göttingen, Math. Phys. Klasse, Nachrichten der, 1906, Heft 3-5; 1907, Heft 1-3. Geschäftliche Mittheilungen, 1907, Heft 1.

Hamburg—Mitteilungen aus dem Naturhistorischen Museum, Jahrgang 1-23, 1885-1905.

Heidelberg—Berichte über Land- und Forstwirtschaft in Deutsch Ostafrika, Band iii., Heft 1, 2.

Kiel—Naturwissenschaftlichen Vereins für Schleswig-Holstein, Schriften des, Band xiii., Heft 1, 2.

München—Sitzungsberichte der K.B. Akademie der Wissenschaften zu München, Math. Phys. Klasse, 1906, Heft 2, 3; 1907, Heft 1. Abhandlungen; Band lxxvi.

——— Zeitschrift für das gesamte Schiess- und Sprengstoffwesen, Jahrgang 1, No. 17.

Nürnberg—Naturhistorischen Gesellschaft zu Nürnberg, Abhandlungen der, Band xi., Heft 3. Report for year 1904.

Vienna—Kaiserliche Akademie der Wissenschaften in Wien, Sitzung der Math. Naturwiss., Jahrgang 1907, Nos. 6-13, 14-17.

——— K.K. Gradmessungs Bureau, Astronomische Arbeiten d., Band xiv.

——— Verhandlungen der Oestreichischen Kommission für die Internationale Erdmessung, Dec., 1905.

——— Annalen des K.K. Naturhistorischen Hofmuseums, Band xx., No. 4; Band xxi., No. 1.

——— Verhandlungen der K.K. Geologischen Reichsanstalt, Jahrgang, 1906, Nos. 1-18; Jahrgang 1907, Nos. 2-10.

——— K.K. Zoologische Botanische Gesellschaft in Wien, Jahrgang 1907, Band lvi.; Jahrgang 1907, Band lvii., Heft 1-5.

Würzburg—Sitzungsberichte der Physikalisch-Medicinischen Gesellschaft zu Würzburg, 1906, Nos. 1-7.

Australia and New Zealand.

Adelaide—Public Library, Museum, and Art Gallery, Annual Report, 1905-6.

——— School of Mines and Industries, Annual Report, 1906.

——— Department of Mines, Short Review, Half-year, to June 30, 1906.

——— Woods and Forests Department, Annual Progress Report, 1905-6.

——— Geological and General Reports, Northern Territory of South Australia, North-Western District, 1905, and Supplement to No. 55, 1906.

——— The Crown Lands Laws of South Australia for 1905.

——— Adelaide Philosophical Society, Natural History of South Australia, 1880.

——— Adelaide Chamber of Commerce, Annual Report, 1907.

——— Handbook of the South Australian Company, 1898.

——— Geological Report of the Stannary Hills Mines, by Dr. Logan Jack, F.G.S., 1907, presented by Mr. Sam. Dixon.

Brisbane—Queensland Department of Mines, Geological Survey, Publications 201, 203, 205, 207-213.

——— Queensland Flora, vol. xvi., parts 7-9; vol. xvii., parts 1, 2, 3, 5, 6; vol. xviii., parts 2, 3.

——— Annals of the Queensland Museum, No. 7. The Weeds and Suspected Poisonous Plants of Queensland, parts 1-15, pages 1-246.

Geelong—Geelong Naturalist, vol. iii., Nos. 1-3.

Melbourne—Victoria Department of Agriculture, Journal, vol. iv., part 12; vol. v., parts 1-9.

——— Department of Mines, Bulletins Nos. 21, 22. Memoirs, 1907, Nos. 4, 5. Special Report.

——— Department of Mines, Geological Survey Records, vol. i., part 4.; vol. ii., part 1. Bulletins, 1907, Nos. 19, 20.

——— Mines and Water Supply, Annual Report, 1906.

——— Victorian Yearbook, 1905.

——— Royal Society of Victoria, Proceedings, vol. xix., New Series, part 2.

——— Victorian Geographical Journal, vol. xxiii., xxiv., 1905-6.

——— Victorian Naturalist, vol. xxii., No. 12; vol. xxiii., Nos. 7-11; vol. xxiv., Nos. 1-5.

Hobart—Royal Society of Tasmania, Papers and Proceedings, 1903-5.

Launceston—Department of Mines, Progress Reports, September, 1906, to June, 1907.

——— The Tasmanian Naturalist, vol. i., No. 1.

Perth—Meteorological Observations, 1905.

——— Department of Mines, Report, 1906.

——— Western Australian Natural History Society, Journal, No. 3, Catalogue of Books.

——— Geological Survey Bulletin, Nos. 24-26, 1907; No. 5, 1900.

——— Government Gazette, Supplement to, June to December, 1905, Nos. 40, 43, 47, 54, 59, 76, 1906; Nos. 2, 4, 10, 16, 19, 22, 29, 37, 41, 49, 1907.

——— Perth Catalogue of Standard Stars 31° and 41° S., 1905.

——— The Next International Scheme, vol. lxv., No. 9, a Suggestion by W. Ernest Cooke.

Sydney—Department of Mines, Annual Report, 1906.

——— Department of Mines and Agriculture, Agricultural Gazette, vol. xvii., part 12; vol. xviii., parts 1-9. Supplement to vol. xvii. Miscellaneous Publication No. 1040.

Sydney—Department of Mines, Records of the Geological Survey, vol. viii., part 3, 1907.

——— Royal Society of New South Wales, Journal and Proceedings, vols. xxxvii., xxxviii., 1903-5; vol. xl., September and December, 1906.

——— Linnean Society, Proceedings, vol. xxxi., parts 3, 4, No. 123; vol. xxxii., part 1, No. 125; part 2, No. 126.

——— An Aroid New for Australia, by J. H. Maiden, Australian Museum, Report the 51st, 1905; 52nd, 1906. Memoirs, No. iv., part 10. Records, vol. vi., parts 4, 5. Nests and Eggs of Birds found Breeding in Australia, by A. J. North, vol. ii., parts 1 and 2.

——— Public Library, Report of Trustees, 1906, 1905.

——— Botanic Gardens and Domain, Report, 1906.

——— Botanic Gardens, Biographical Notes, Section D, Address by the President.

——— New South Wales Naturalists' Club, vol. i., parts 4, 5.

——— Fisheries of New South Wales, Report of Commissoners, 1905, 1906.

——— Fishes of Australia.

——— The Forest Flora of New South Wales, vol. ii., parts 11-20; vol. iii., parts 2-6.

——— Sydney University Calendar, 1906-1907.

——— Royal Anthropological Society of Australia, Journal, vol. viii., No. 5; vol. ix Nos. 1-6, 8, 9. A List of Cyclophoridæ found in Australia, New Guinea, and adjacent groups of Islands, by J. C. Cox, M.D.

Auckland—Auckland Institute and Museum, Annual Report, 1906-7.

Christchurch—Canterbury Museum, Records, vol. i., No. 1.

Wellington—Special Reports on Educational Subjects. New Zealand Geological Survey, North-west Mines, Bulletin Nos. 2, 3.

———— Catalogue of Plants of New Zealand.

Belgium and Holland.

Brussels—Société Entomologique de Belgique, Annales de la, tome l.

——— Société Royale de Botanique de Belgique, Bulletin, 1904-5.

——— Musée Royale d'Histoire Naturelle de Belgique, Memoires, tome iii., 1906.

——— Le Mouvement Sociologique International, Publication No. 83

Liège—Société Royale des Sciences, Memoires, 3rd Series, tome vi.

Amsterdam—Naturkundig Tydschrift voor Nederlandsch-Indie, deel lxvi.

Canada.

Halifax—Nova Scotian Institute of Sciences, Proceedings and Transactions.

Ottawa—Canadian Department of the Interior, Hamilton Sheet, Kluanee Sheet. Geological Survey, Annual Report, Palæontology, etc., vol. iii., part 4; vol. xv., 1902-3; 1901, and Maps, 1904, 1905, 1906; Preliminary Report and Summary Report. Maps, Nos. 59-65; 74-76; 82-83.

England, Ireland, and Scotland.

London—Conchological Society, Journal, vol. xi., No. 12; vol. xii., Nos. 1-3.

——— Entomological Society, Transactions, 1902, 1906.

——— Royal Colonial Institute, Proceedings, vol. xxxi., No. 4. Report, vol. xxxviii., 1906-7.

——— Linnean Society, Proceedings, 1906. List of Members, 1906-7.

——— Royal Society of London, Year Book, 1907. Proceedings Mathematical and Physical Sciences, vol. Alxxviii., Nos. A524-526; vol. Alxxix, Nos. A527-532.

——— Biological Sciences, Series B., vol. lxxviii., No B526; vol. lxxix., Nos. B527-533.

——— Royal Microscopical Society of London, Journal, 1906, parts 5, 6; 1907, parts 1-4.

——— National Physical Laboratory, Report, 1906. Collected Researches, vol. ii.

——— Royal Gardens, Kew, Bulletin, 1906.

——— The State Correspondent, etc., vol. xii., No. 10; vol. xiii., Nos. 2-8.

——— The Periodical, 1905, No. 32; 1906, Nos. 34, 36, 37; 1907, Nos. 38-40.

——— The British Association, Report, for each year from 1831 to 1884 (from the Engineer-in-Chief's Department, S. Aus.).

——— Gordon's Tomb and Golgotha, by A. W. Crawley-Boevey, M.A., Bombay Civil Service, Barrister-at-law.

Liverpool—Biological Society, Proceedings and Transactions, vol. xx., 1905-6.

Manchester—Literary and Philosophical Society, Memoirs and Proceedings, vol. li., parts 1-3.

———— Geological Society, Transactions, vol. xxviii., part 16.

———— Field Naturalists' and Archæologists' Society, Report and Proceedings, 1906.

Cambridge—Philosophical Society, Proceedings, vol. xiii., part 6; vol. xiv., parts 1, 2.

———— University Library, Report of Library Syndicate, 1906.

Belfast—Natural History and Philosophical Society, Report and Proceedings, 1905-6.

Dublin—Royal Dublin Society, Economic Proceedings, vol. i., parts 8, 9. Scientific Proceedings, vol. ii., Nos. 10-12. Scientific Transactions, vol. ix., parts 4, 5.

——— Royal Irish Academy, Proceedings, vol. xxvi., section A, Nos. 1, 2; sections B, Nos. 4-9; section C, Nos. 5-16; vol. xxvii., section A, Nos. 1, 2. Abstract of Minutes, 1905-6.

Edinburgh—Royal Physical Society, Proceedings, vol. xvi., pp. 267-435; vol. xvii., pp. 65-80, 81-120. Sessions 1899, 1902.

———— Royal Society of Edinburgh, Proceedings. vol. xxvi., pp. 193-575; vol. xxvii., pp. 1-160.

———— Geological Society, Transactions, vol. viii., special part; vol. viii., parts 1, 2.

France.

Caen—Société Linnéenne de Normandie, Bulletin, series 5, vol. ix., 1905.

Nantes—Société des Sciences Naturelles de l'Ouest de la France, Bulletin, tome vi., Nos. 1-3.

Paris—Société Entomologique de France, Bulletin, 1906, Nos. 15-21; 1907, Nos. 1-12; Annales, 1903, Nos. 1-4; 1904, Nos. 1-4; 1905, Nos. 1-4; 1906, Nos. 1-4; 1907, Nos. 1 and 2. Publications, tome ii.

——— La Feuille des Jeunes Naturalistes, Nos. 432-443.

Italy.

Florence—Società Entomologica Italiana, Bulletino della, xxxvii., trim. 1-2.

Milan—Società Italiana di Scienza Naturali e del Museo Civico de Storia Naturale in Milano, vol. xlv., fasc. 3, foglio $6\frac{3}{4}$; vol. xlvi., fasc. 1, fog. $5\frac{3}{4}$; General Index, 1906.

Pisa—Società Toscana di Scienza Naturali, Memorie, vol. xxii.; Processi Verbali, vol. xv., No. 5; vol. xvi, Nos. 1-3.

INDIA.

Calcutta—Imperial Department of Agriculture, Annual Report.

——— Board of Scientific Advice, Annual Report, 1905-6.

——— Department of Agriculture in India, Memoirs, 1906, vol. i., Nos. 1-3; vol. i., No. 4. Botanical Series, 1907, vol. i., Nos. 3-5. Entomolog. Series, vol. i., Nos. 1, 2, 4. Chemical Series, vol. i., Nos. 5, 6. Botanical Series, vol. ii., No. 1.

——— Indian Museum, Investigator, 1906, part iii. The Alcyonarions of the Deep Sea. Annual Report, 1905-6.

Madras—Government Museum, Bulletin, vol. v., Nos. 2, 3. From the Annals and Magazine of Natural History, 1906, series 7, vol. xviii. Ethnographic Notes of Southern India, 1906.

Pusa—Agricultural Research Institute, Bulletin, 1906, No. 4. First Report on Fruit Experiments.

JAPAN.

Kyóto—Imperial University Calendar.

Tokyo—Imperial University of Tokyo, College of Science Journal, vol. xxi., art. 2-6; vol. xxii.

——— Seismological Society, Earthquake Investigation Committee, Publication No. 22, art. 1-4, Nos. 23, 24; Bulletin, vol. i., Nos. 2-4.

——— Asiatic Society of Japan, Transactions, vol. xxxiv., parts 1-4.

MEXICO.

Mexico—Sociedad Cientifica, Memorias y Revista, tomo 22, num. 7-12; tomo 23, num. 5-12; tomo 24, num. 1-5.

——— Instituto Geologico de Mexico, Boletin del, num. 22, 24.

NORWAY AND SWEDEN.

Bergen—Museums Aarbog, 1905, Hefte 2; 1906, Hefte 2, 3; 1907, Hefte 1, 2; Aarsberetning, 1906.

——— Bergens Museum, Meersfauna von Bergen, Hefte 2, 3.

Christiania—Sundry Geological Problems, by G. Henricksen, Inspector of Mines, Christiania, 1906.

Stockholm—Entomologisk Tidskrift; Arg. 26, Hefta 1, 2. Arg. 27, Hefta 3, 4.

——— Geologiska Föreningens Förhandlingar, Band. xxxii., 1906; Band. xxviii., Hefte 1.

——— Kongelige Vitterhets Historie och Antiquitets Akademiens Manadsblad, 1903-5.

——— A Short Handbook on Sweden, 1906.

——— Fornvännen, Meddelanden fran K. Vitterhetshistorie och Antikvitets Akademie, 1906.

Stavanger—Museum, Aarshefte, 16de Aargang, 1905.

Trondhjem—Kongelige Norske Videnskabs Selskabs Skrifter, 1905.

——— Carl von Linnés Forbindelse med Norge af Ove Dahl, 1907.

RUSSIA.

St. Petersburg—Academie Impériale des Sciences de St. Petersbourg, Bulletin, Classe Historico-Philo; 1904-1907, series 5, tome xxi.. No. 5; tome xxii., Nos. 1-5; tome xxiii., Nos. 1-5; tome xxiv., Nos. 1 and 2; 1907, series 6. Nos. 1-11.

——— Comité Géologique, Bulletins, tome xxii., Nos. 2, 4; tome xxiii., Nos. 7-10. Memoires, tome xxii., liv. 6, 7, 9, 12, 18, 19; tome 20, liv. 2; tome 15, liv. 1.

——— Russischen Kaiserlichen Mineralogischen Gesellschaft zu St. Petersburg, Verhandlungen der, 1905; series 2, 1906.

——— Materialen zur Geologie Ruslands. Herausgegeben von der Kaiserlishen Mineralogischen Gesellschaft, Band. xxiii., lief 1.

Kiev—Société des Naturalistes de Kiev, Memoires, tome xx., liv. 2, 1906.

Moscow—Société Imperiale des Naturalistes de Moscow, Bulletin No. 4, 1905; Nos. 1, 2, 1906.

FINLAND.

Finland—Der Geographische Verein in Finland, Meddelanden af Geog. Föreningen, 1904-6.

SWITZERLAND.

Geneva—Société de Physique et de Histoire Naturelle, Compte rendu des Scéances, xxiii., 1906.

——— L'Institut National Genevois, Bulletin, vol. xxxvii.

Lausanne—Société Vaudoise des Sciences Naturelles, Bulletin, vol. lii., Nos. 156, 157; vol. liii., No. 158. Meteor: Observations faites au Champ-de l'Air.

Neuchatel—Société Neuchateloise des Sciences Naturelles, Bulletin, tome xxxii., year 1903-4.
Zürich—Annotationes Concilii Bibliographici, vol. ii., anno. 1906.

South and Central America.

Lima—Cuerpo de Ingenieros de Minas de Peru, Boletin del, Nos. 37-46. Secunda Memoria, 1904-5.
Monte Video—Museo Nacional, Anales, tomo iii., entrega i.
Rio de Janeiro—Observario do Rio de Janeiro, Boletin Mensal, 1905-1906.

South Africa.

Albany—Museum, Records, vol. ii., part 1.
Cape Town—South African Museum, Report, 1906.
——— South African Association for the Advancement of Science, Reports for years 1905, 1906.
——— South African Philosophical Society, Transactions, vol. xv., part 5, 1905; vol. xiii., part 2; vol. xvi., parts 4, 5; vol. xvii., part 1.
Natal—South African Surveyor-General's Department, Report, third and final.

Sandwich Islands.

Honolulu—The Bernice Pauahi Bishop Museum, Occasional Papers and Report, 1906, vol. iv., No. 1; vol. iii., No. 1; 1907, vol. ii., No. 5. Directors' Report, with Index to vol. ii.

United States of America.

Baltimore—John Hopkins University, Circulars, Nos. 3-9. History and Political Science, series xxiv., Nos. 3-10. American Chemical Journal, vol. xxxv., Nos. 5, 6; vol. xxxvi., Nos. 1-6; vol. xxxvii., Nos. 1, 5.
Boston—Society of Natural History, Proceedings, vol. xxxii., Nos. 3-12 and index; vol. xxxiii., Nos. 1-12.
——— American Academy of Arts and Sciences, Proceedings, vol. xli., No. 35; vol. xlii., Nos. 2-18.
——— University of California, Pubs. Zoology, vol. iii., No. 2, pp. 13-38, plates 3-7; do., do., American Archæology and Ethnology, vol. iv., Nos. 1-2. College of Agriculture, Nos. 177, 178.

Cambridge—Museum of Comparative Zoology, Harvard College, Report, 1905-6; Geological Series, Bulletins, vol. xliii., No. 5; vol. xlix.; vol. l., Nos. 4 and 5, 8, 9; vol. li., Nos. 1-4.

Chicago—Field Columbian Museum, Geological Series, vol. ii., Nos. 8, 9; vol. iii., Nos. 3, 4. Zoological Series, vol. vii., Nos. 2, 3.

Indiana—Academy of Science, Proceedings, 1906.

Kansas—Kansas University, Bulletin, vol. vi., No. 2; vol. vii., No. 3.

——— The University Geological Survey of Kansas, Bulletin, 1903-1904, vol. viii.

Massachusetts—Tufts College Studies, vol. ii., No. 2

Missouri—Missouri Botanical Gardens, Annual Report, 1906.

New York—Public Library, Bulletin, vol. ix., No. 2; vol. x., Nos. 9-12; vol. xi., Nos. 1-7.

——— Studies from the Rockefeller Institute for Medical Research, vol. v., 1906.

——— American Museum of Natural History, Journal, vol. vi., No. 3. Memoirs, Whole Series, vol. vi., part 1; vol. v., part 3; vol. x., part 1; vol. xiv., part 1. Memoirs, Geological Fossils, 1904, vol. ii, part 1; 1905, vol. iv., part 5; 1906, vol. viii., part 1; 1907, vol. iv., part 6. Guide Leaflets, Nos. 24, 25. Academy of Sciences, Annals, vol. xvi., part 3; vol. xvii., part 1.

——— The Museum of the Brooklyn Institute of Arts and Sciences, vol. i., Nos. 4, 8, 9.

——— Cold Spring Harbour Monographs, No. 6.

——— Carnegie Institution of Washington, Zoological Experimental do., do., Nos. 4-7, Yearbooks, No. 5, 1906.

——— American Museum, Journal, vol. vi., No. 4; vol. vii., Nos. 1, 2, 4, 5.

——— The Journal of Geography, vol. v., No. 8.

Ohio—Wilson Bulletin, Oberlin College Library, Nos. 56, 57.

———Scientific Laboratories, Denison University, Granville, Bulletin, vol. xiii., art 3.

Philadelphia—Academy of Natural Sciences, Proceedings, vol. lviii., parts 1, 2.

——— American Philosophical Society, Proceedings, vol. xlv., Nos. 182, 183; Transactions, vol. xxi., part 3.

——— The Philadelphia Commercial Museum, Report, 1898.

St. Louis—The Academy of Science of St. Louis, Transactions, vol. xvi., Nos. 1-7.

Washington—Smithsonian Institution, U.S. National Museum, Bulletin, No. 39, parts P and Q; No. 56, part 1. Proceedings, vols. xxx., xxxi. Contributions, vol. x., parts 3, 4; vol. xi., part 1. Annual Report, 1905, 1906. Annual Report of Board of Regents, 1905. Bureau of American Ethnology, Bulletin, No. 32.

———— United States Geological Survey, Professional Papers, series A, B, C, No. 51, A70, B87, B77, C49, C77; No. 52, B89, C55; No. 54, A76, B95; Nos. 51, 55.

———— Department of the Interior, Annual Report, No. 26; Bulletin, Nos. 283-285, 289, 290, 292, 293, 295, 298, 299, 301, 302.

———— Water Supply and Irrigation, Paper, Nos. 119, 154, 157, 159-162, 165, 167, 169, 171, 172, 174, 175, 177, 179-181, 184-186.

———— Topographic Maps, folios 136-140.

———— Academy of Sciences, Proceedings, vol. viii., pp. 167-403, 407-491; vol. ix., pp. 1-274.

Philippine Islands—Manilla, The Far Eastern Review, vol. iv., No. 1.

Trenton—New Jersey, Archæologia Nova Cæsarea, by Charles Conrad Abbott, M.D.

Urbana—Illinois State Laboratory of Natural History, Bulletin, vol. vii., articles 6-9.

LIST OF FELLOWS, MEMBERS,

ETC.,

OCTOBER, 1907.

Those marked (L) are Life Fellows. Those marked with an asterisk have contributed papers published in the Society's Transactions.

Any change in the address should be notified to the Secretary.

Date of Election

HONORARY FELLOWS.

1893. *COSSMAN, M., Rue de Maubeuge, 95, Paris.
1897. *DAVID, T. W. EDGEWORTH, B.A., F.R.S., F.G.S., Prof. Geol., Sydney University.
1876. ELLERY, R. L. J., F.R.S., F.R.A.S., Gov. Astron., the Observatory, Melbourne, Victoria.
1890. *ETHERIDGE, ROBERT, Director of the Australian Museum of New South Wales, Sydney.
1905. GILL, THOMAS, I.S.O., Under-Treasurer, Adelaide.
1905. *HEDLEY, CHAS. H., Naturalist, Australian Museum, Sydney.
1892. *MAIDEN, J. H., F.L.S., F.C.S., Director Botanic Gardens, Sydney, New South Wales.
1898. *MEYRICK, E. T., B.A., F.R.S., F.Z.S., Thornhanger, Marlborough, Wilts, England.
1894. *WILSON, J. T., M.D., Prof. of Anatomy, Sydney University.

CORRESPONDING MEMBERS.

1881. BAILEY, F. M., F.L.S., Colonial Botanist, Brisbane, Queensland.
1907. *BASEDOW, HERBERT, Breslau University, Germany.
1880. *FOELSCHE, PAUL, Inspector of Police, Palmerston, N.T.
1893. STRETTON, W. G., Palmerston, N.T.
1905. THOMSON, G. M., F.L.S., F.C.S., Dunedin, New Zealand.

FELLOWS.

1895. *ASHBY, EDWIN, Royal Exchange, Adelaide.
1902. *BAKER, W. H., Glen Osmond Road, Parkside.
1907. BLACK, J. MCCONNELL, Alfred Street, Norwood.
1887. *BLACKBURN, Rev. THOMAS, B.A., Woodville.
1886. *BRAGG, W. H., M.A., F.R.S., Prof. of Mathematics and Physics, University of Adelaide.
1905. BROOKMAN, GEORGE, North Gilberton.
1883. BROWN, H. Y. L., F.G.S., Gov. Geologist, Adelaide.
1893. BRUMMITT, ROBERT, M.R.C.S., Gilberton.
1904. BRUNKSKILL, GEORGE, Semaphore, S.A.
1906. BUNDEY, MISS ELLEN MILNE, 148, Molesworth Street, North Adelaide.
1907. CHAPMAN, R. W., M.A., B.C.E., Prof. of Engineering, University, Adelaide.
1904. CHRISTIE, WILLIAM, Adelaide.
1879. *CLELAND, W. L., M.B., Ch.M., J.P., Colonial Surgeon, Resident Medical Officer Parkside Lunatic Asylum, Lecturer in Materia Medica, University of Adelaide.

1895. Cleland, John B., M.D., Perth, Western Australia.
1907. *Cooke, T. W., D.Sc., Lecturer, University, Adelaide.
1907. Darling, John, Kent Terrace, Norwood.
1887 *Dixon, Samuel, Bath Street, New Glenelg.
1902. Edquist, A. G., Hindmarsh.
1904. Gartrell, Jas., Burnside.
1904. Gordon, David, Gawler Place, Adelaide.
1880. *Goyder, George, A.M., F.C.S., Analyst and Assayer, Adelaide.
1896. Greenway, Thos. J., Adelaide.
1904. Griffith, H., Hurtle Square, Adelaide.
1896. Hawker, E. W., F.C.S., Adelaide.
1899. *Higgin, A. J., F.I.C., Assistant Lecturer on Chemistry, School of Mines, Adelaide.
1891. *Holtze, Maurice, F.L.S., Director Botanic Gardens, Adelaide.
1883. *Howchin, Walter, F.G.S., Lecturer on Geology and Palæontology, University, Adelaide.
1902. Iliffe, Jas. Drinkwater, B.Sc., Prince Alfred College, Kent Town.
1893. James, Thomas, M.R.C.S., Moonta.
1902. Jeffreys, Geo., Gilbert Place, Adelaide.
1900. *Johncock, Chas. F., Morphett Vale.
1897. *Lea, A. M., Gov. Entomologist, Hobart, Tasmania.
1884. Lendon, A. A., M.D. (Lond.), M.R.C.S., Lecturer on Forensic Medicine and on Chemical Medicine, University, Adelaide, and Hon. Physician, Children's Hospital, North Adelaide.
1856. Lloyd, J. S., Alma Chambers, Adelaide.
1888. *Lower, Oswald B., F.E.S. (Lond.), Broken Hill, New South Wales.
1905. *Mawson, Douglas, B.Sc., B.E., Lecturer on Mineralogy and Petrology, University, Adelaide.
1894. Mayo, Geo. G., C.E., Hon. Secretary, 116, Franklin St., Adelaide.
1907. Melrose, Robert Thomson, Mount Pleasant.
1897. *Morgan, A. M., M.B., Ch.B., Angas Street, Adelaide.
1907. Muecke, Hugo, C.E., Grenfell Street, Adelaide.
1884. Munton, H. S., North Terrace, Adelaide.
1883. Phillipps, W. H., Adelaide.
1886. Poole, W. B., Savings Bank, Adelaide.
1907. Pulleine, R. H., M.B., C.M., Adelaide.
1907. Purdue, R. F., Mining Agent, Launceston, Tasmania.
1904. Reissmann, Charles, M.A., M.D. (Cantab), B.Sc. (Lond.), etc., Adelaide.
1885. *Rennie, Edward H., M.A., D.Sc. (Lond.), F.C.S., Professor of Chemistry, University of Adelaide.
1905. *Rogers, R. S., M.A., M.D., Flinders Street, Adelaide.
1869. *Rutt, Walter, Chief Assistant Engineer, Adelaide.
1891. Selway, W. H., Treasury, Adelaide.
1893. Simson, Augustus, Launceston, Tasmania.
1857. Smeaton, Thomas D., Mount Lofty.
1900. Smeaton, Stirling, B.A., C.E., Engineer-in-Chief's Office, Adelaide.
1871. Smith, Robert Barr, Adelaide.
1881. *Stirling, Edward C., C.M.G., M.A., M.D., F.R.S., F.R.C.S., Professor of Physiology, University of Adelaide, Director of S.A. Museum.

1906. Snow, F. H., Mutual Chambers, Adelaide.
1907. Sweetapple, H. A., M.D., Park Terrace, Parkside.
1904. Taylor, William, St. Andrews, North Adelaide.
1886. *Tepper, J. G. O., F.L.S., Entomologist, S.A. Museum. (Corresponding Member since 1878).
1897. *Torr, W. G., LL.D., M.A., B.C.L., Brighton, South Australia.
1894. *Turner, A. Jefferis, M.D., Wickham Terrace, Brisbane, Queensland.
1902. Vandenbergh, W. J., F.R.S.L., F.R.S.E., F.R.M.S., J.P., Barrister and Solicitor, Pirie Street, Adelaide.
1889. Vardon, Joseph, J.P., Gresham Street, Adelaide.
1878. *Verco, Joseph C., M.D., F.R.C.S., Lecturer on the Principles and Practice of Medicine and Therapeutics, University of Adelaide.
1883. Wainwright, E. H., B.Sc. (Lond.), Wellington Road, Maylands.
1878. Ware, W.L., J.P., Adelaide.
1859. Way, Right Hon. Sir Samuel James, Bart., P.C., D.C.L., Chief Justice and Lieutenant-Governor of South Australia, Adelaide.
1907. Webb, Noel A., Barrister, Waymouth Street, Adelaide.
1904. Whitbread, Howard, Currie Street, Adelaide.
1902. *Woolnough, Walter George, D.Sc., F.G.S., University, Sydney, New South Wales.
1886. *Zietz, A. H. C., F.L.S., C.M.Z.S., Assistant Director South Australian Museum, Adelaide.

Associates.

1901. Collison, Miss Edith, B.Sc., Flinders Street, Adelaide.
1904. Robinson, Mrs. H. R., "Las Conchas," Largs Bay, South Australia.

APPENDICES.

FIELD NATURALISTS' SECTION

OF THE

Royal Society of South Australia (Incorporated).

TWENTY-FOURTH ANNUAL REPORT OF THE COMMITTEE

For the Year Ended September 30, 1907.

Evening Meetings.

The monthly meetings of the Section, held during the winter months, have been well attended, and the exhibits numerous and instructive.

On October 16, 1906, Dr. Ramsay Smith gave an interesting lecture in the Prince of Wales Lecture Theatre (kindly lent by the University for the occasion) on his tour through Northern Australia and the East. The lecture dealt specially with the Australian aboriginals in their ethnology and customs, and was illustrated by a large number of excellent lantern slides.

November 20. Dr. R. S. Rogers, M.A., delivered the Chairman's Address, which had been unavoidably postponed. His subject was the work of Robert Brown, the Naturalist on board the "Investigator" with Flinders. The lecturer emphasized the debt which Australia owes to Brown, who amidst great difficulties collected and named a very great number of Australian plants.

April 16, 1907. Dr. Pulleine gave a lecture on "The Classification of Australian Birds," illustrated by a great number of specimens.

May 21. Papers were read supplying observations made during the Easter excursion to Kangaroo Island, as follows:—Dr. R. S. Rogers, on ichthiology; Mr. J. W. Mellor, ornithology; Mr. Griffiths, entomology; and Mr. W. H. Selway, on botany.

June 18. Mr. D. Mawson, B.E., B.Sc., gave an interesting account of his journey to Mount Kosciusko, "the roof of Australia."

July 16. Dr. H. Pulleine, on the "Classification of

Spiders," with their life history, habits, etc., illustrated by references to the common house and garden spiders.

August 20. Mr. J. G. O. Tepper, F.L.S., discoursed on "Natural History Objects of Common Interest," based on a miscellaneous collection of insects forwarded to him by an anonymous correspondent.

Excursions.

The first of the year was held on October 13 at Grenville Glen by invitation of Mr. G. J. Ireland, when an opportunity was afforded of exploring the sources of Brown Hill Creek at Crafers. The leading feature was the collection of botanical specimens which were in great profusion along the creek, a spot that is not much disturbed by man or beast.

Next followed the three days' excursion on November 10, 11, and 12, with Myponga as the rendezvous. This district is one of the best within comparatively easy reach of the city for botanical work. In this locality are to be found many rare specimens of interest not met with in the Mount Lofty Ranges. The party was comfortably provided for at private houses. On the second day after arrival the party was conducted to Lovely Valley, on the Yankalilla Road, and on the following day the swampy country was exploited, where collectors had an interesting time amongst both land and water plants. Orchid-hunters were particularly well favoured. This perhaps most interesting order of all our native flowers has become quite an interesting feature of all the field work since its special introduction by our late Chairman, Dr. Rogers, who is a recognized authority on the subject, and has described four new species and three new to the State, during the year, in the Transactions of the Royal Society of South Australia.

The annual picnic was held on December 15 at the National Park. Following the afternoon's enjoyment, the Chairman, Mr. J. McC. Black, invited the party to tea at the Belair Hotel.

During midsummer two marine excursions were arranged, which took place in February and March. The Port Adelaide River, as far as the Outer Harbour, was the selected ground for dredging operations. On these occasions members belonging to the Microscopical Section joined in the outing, and interesting results were obtained.

The Easter holidays were taken advantage of by a number of members, who arranged to visit Kangaroo Island. This was the first occasion upon which the section had gone so far afield. Penneshaw was made the centre for operations, and excursions were made to Antechamber Bay, the south coast, and Mount Thisbe, at the head of American River. The special studies were ornithology, entomology, and botany. The collectors in each of these branches were amply repaid for the journeyings, and the Easter trip to Kangaroo Island will probably become an annual fixture.

May 4 found the members again in the field at Upper Sturt, taking the road *via* the National Park. The results obtained on this excursion were chiefly ornithological. It is gratifying to note that the native birds, whilst driven from the open by the extension of the areas of closer settlement, find in the park a secure retreat.

Hallett's Cove has special attractions for the naturalist, and on June 3 fifty members, with the Microscopical Section, journeyed thither for a whole day's excursion, which yielded points of interest in most departments of natural-history studies.

On June 15 the Mount Lofty district was again visited, the vicinity west of the railway station being explored. The district is the home of the *Epacris*, and the scrub was a beautiful profusion of red colourings from this favourite flower. Mr. T. D. Smeaton led the party on this occasion, and amongst many other observations drew attention to the geological formation of the hills, and the consequent peculiarities of their physical geography.

Athelstone, at the foot of the Black Hill, is a popular locality, and a good number travelled thither. It was suitable weather for climbing, and some of the members gained the summit of the hill. Botanists were particularly well rewarded in collecting early varieties of plants.

July 27 was the one day of the year's arrangements that could not be counted a success. The appointment was a walk across the swampy country from the Glenelg Railway to a ridge of pine forest on the Grange seacoast. The weather and the place were equally uninviting, and the few members who essayed the journey were disappointed with the result.

Blackwood easily holds the palm for botany of all the districts near to the city, and by the kind permission of Mr. C. Downer, the Craigburn Estate was traversed as far as time would permit, on August 17. Where the flowers are, there also are the insects and the birds, and the naturalists always enjoy a ramble in this district, for so much is to be observed.

For business purposes, the year for the Section closes on September 30, and the annual general meeting is held on the third Tuesday of the same month. The last excursion during the business year, therefore, was held on the holiday proclaimed for September 1. This gave the opportunity to hold a three-days' outing to Victor Harbour. The party left on the Saturday afternoon, and broke the journey for a ramble in the Aldgate scrub, after which tea was arranged, and the train taken to complete the journey to the Harbour. It was eight years since the section had paid a visit to the place. On the second day they drove out towards Square Waterhole, where many rare things are to be found, and amply repaid for the visit. The third day a trip was taken to the glaciated pavement, known as "Selwyn's Rock." The coastline was not neglected by the members, and the excursion was regarded as a success.

From this summary of the evening- and day-work of the year it will be seen that the Section has had its time and opportunities fully and profitably occupied.

The members on the roll number 114. which is an increase of 10 for the year.

J. McC. Black, Chairman.
E. H. Lock, Hon. Sec.

NINETEENTH ANNUAL REPORT OF THE NATIVE FAUNA AND FLORA PROTECTION COMMITTEE OF THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF SOUTH AUSTRALIA, FOR THE YEAR ENDED SEPTEMBER, 1907.

In the past year some further work has been done with regard to the proposed Kangaroo Island reserve. On April 20, by arrangement made through Mr. T. H. Smeaton, M.P., the Chairman, Mr. Dixon, and Mr. Ashby, had an interview with the Premier, who intimated that, in consequence of the lessees of portion of the 300 square miles asked for demanding too high a price for the surrender of their holdings, the Cabinet could grant only the Cape Borda lighthouse reserve, containing 60 square miles. Regarding the trustees for the reserve, the Premier requested that a scheme for their appointment should be sent to him. Subsequently a letter was sent, on behalf of the committee, thanking the Premier for the promise of the 60 miles, suggesting that the Act constituting the park should provide for further extension to the area originally asked for, and recommending that the following divisions of natural history, namely, general zoology, ornithology, marine zoology, and botany, should be represented upon the Board of Trustees, one gentleman representing each division being nominated by the University, and one representing each division by the Royal Society. No reply has yet been received; but the committee hope that their suggestions may be adopted, and that mistakes such as have been made in appointing the Board of the National Park be thus avoided. The committee is pleased to learn that the Crown lands in the districts of Barossa, Para Wirra, and Mount Crawford have been proclaimed a kangaroo district, and that kangaroos will be absolutely protected therein for a period of ten years. They have under consideration the question of recommending the proclamation of other districts.

The Committee is also glad to know that nature study is now to find a place in our public-schools curriculum, a course which they recommended at a deputation which waited upon the Minister of Education about fifteen years ago.

SAML. DIXON, Chairman.

Adelaide, September 17, 1907.

FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF SOUTH AUSTRALIA (INCORPORATED).

Statement of Receipts and Expenditure for the Year ended September, 1907.

Dr. Receipts.	£	s.	d.	Expenditure.	£	s.	d. Cr.
Received from Secretary, October, 1906 ...	1	13	3	By Printing	4	9	6
To Subscriptions for 1906-7	26	2	6	,, Caretaker	1	10	0
,, Grant from the Royal Society, September 18, 1907	12	0	0	,, Advertising	0	10	0
				,, Minute-book and Envelopes	0	5	0
				,, Postages	5	7	3
				,, Subscriptions paid to Royal Society ...	25	0	0
				,, Balance	2	14	0
	£39	15	9		£39	15	9

Audited and found correct.

J. S. Lloyd,
Walter D. Reed, } Auditors.

S. Walters, Hon. Treasurer.

Adelaide, September 16, 1907.

MALACOLOGICAL SECTION

OF THE

Royal Society of South Australia (Incorporated).

ANNUAL REPORT, 1906-7.

The work of revising the census of S.A. mollusca was continued, and the following is the revised list:—

Family STOMATIIDÆ.

53. Stomatella imbricata, Lamarck. Anim. S. Vert., 1822, vol. vi. (2), p. 209.

54. Gena nigra, Quoy & Gaimard *(Stomatella)*. Voy. Astrolabe, Zool., 1834, vol. iii., p. 307, pl. lxvi. bis, f. 10-12. *Stomatia (Gena) strigosa*, A. Adams.

55. Gena terminalis, Verco. Trans. Roy. Soc. S. Austr., 1905, vol. xxix., p. 166, pl. xxxi, f. 4-5.

Family TURBINIDÆ.

56. Turbo jourdani, Kiener. Rev. Zool., 1839, p. 324.

57. Turbo gruneri, Philippi. Zeits. fur Malak., 1846, p. 98, No. 6. *T. circularis*, Reeve.

58. Turbo undulatus, Martyn *(Limax)*. Univ. Conch., 1784, vol. i., f. 29; *L. anguis*, Martyn; *Simsoni*, Ten. Woods.

59. Turbo stamineus, Martyn *(Limax)*. Univ. Conch., 1784, vol. ii., f. 71. *T. torquatus*, Gmelin: *T. lamellosus*, Philippi.

60. Astralium fimbriatum, Lamarck *(Trochus)*. Anim. S. Vert., 1822, vol. vii., p. 12. *T. squamiferus*, Koch.

61. Astralium aureum, Jonas *(Trochus)*. Zeits. fur Malak., 1844, p. 168. *Carinidea granulata*, Swainson: *C. tasmanica*, Ten. Woods.

62. Astralium rutidoloma, Tate. Trans. Roy. Soc. S. Austr., 1893, vol. xvii., part i., p. 192, pl. 7, f. 9.

63. Leptothyra rosea, Ten. Woods *(Monilea)*. Proc. Roy. Soc. Tasm., 1876, p. 154. *Collonia roseo-punctata*, Angas.

64. Leptothyra josephi, Ten. Woods *(Cyclostrema)*. Proc. Roy Soc. Tasm., 1877, p. 147.

65. Leptothyra arenacea, Pritchard & Gatliff. Proc. Roy. Soc. Vict., 1902, vol. xiv. (n.s.), part ii., p. 181, pl. ix., f. 3.

66. Leptothyra carinata, Verco. Trans. Roy. Soc. S. Austr., 1907, vol. xxxi., pl. xxix., f. 8.

Family PHASIANELLIDÆ.

67. PHASIANELLA AUSTRALIS, Gmelin (*Buccinum*). Syst. Nat., 1788, p. 3490, No. 173. *B. tritonis*, Chemnitz; *P. bulimoides*, Lam.; *P. varia*, Lam.; *P. decorata*, Chenu.; *picta*, De Blain; *lehmanni*, Menke; *preissi*, Menke; *venusta*, Reeve; *pulchella*, Ten. Woods; *delicatula*, Ten. Woods; *subsanguinea*, Tryon.

68. PHASIANELLA VENTRICOSA, Quoy & Gaimard. Voy. Astrolabe, 1834, vol. iii., p. 237, pl. lix., f. 8-9. *P. solida*, Desh.; *perdix*, Phil.; *brevis*, Menke; *turgida*, Phil.; *delesserti*, Chenu; *sanguinea*, Reeve; *zebra*, Reeve; *venosa*, Reeve; *reticulata*, Reeve.

69. PHASIANELLA VARIEGATA, Lamarck. Anim. S. Vert., 1822, vol. vii., p. 53. *P. unifascialis*, Kiener; *nivosa*, Reeve; *fulgurata*, Reeve; *angasi*, Crosse; *splendida*, Phil.; *lineolata*, Wood; *viridis*, Anton; *rubens*, Lam.

70. PHASIANELLA ROSEA, Angas (*Eutropia*). Proc. Zool. Soc. Lond., 1867, p. 114, pl. xiii., f. 24.

71. PHASIANELLA VIRGO, Angas (*Eutropia*). Proc. Zool. Soc. Lond., 1867, p. 115, pl. xiii., f. 25.

Family DELPHINULIDÆ.

72. LIOTIA AUSTRALIS, Kiener (*Delphinula*). Icon. Coq. Viv., 1839, vol. x., p. 8, pl. iv., f. 7.

73. LIOTIA CLATHRATA, Reeve (*Delphinula*). Proc. Zool. Soc. Lond., 1843, sp. 21.

74. LIOTIA SUBQUADRATA, Ten. Woods. Proc. Lin. Soc. N.S. Wales, 1878, vol. ii., p. 236.

75. LIOTIA MAYANA, Tate. Trans. Roy. Soc. S. Austr., 1899, vol. xxiii., p. 227, pl. vi., f. 5a-5c. *L. discoidea*, Ten. Woods (non Reeve).

76. LIOTIA DENSILINEATA, Tate. Trans. Roy. Soc. S. Austr., 1899, vol. xxiii., p. 228.

77. LIOTIA TASMANICA, Ten. Woods. Proc. Roy. Soc. Tasm., 1876 for 1875, p. 153. *L. incerta*, Ten. Woods.

78. LIOTIA HEDLEYI, Pritchard & Gatliff. Proc. Roy. Soc. Vict., 1899, vol. xii., p. 105, pl. viii., f. 8, 9, 10.

79. LIOTIA ALAZON, Hedley. Records Austr. Mus., 1905, vol. vi., p. 49, f. 14.

Family CYCLOSTREMATIDÆ.

80. CYCLOSTREMA INSCRIPTUM, Tate. Trans. Roy. Soc. S. Austr., 1899, vol. xxiii., p. 216, pl. vii. f. 3 a and b.

81. CYCLOSTREMA TATEI, Angas. Proc. Zool. Soc. Lond., 1878, p. 862, pl. liv., f. 10.

82. CYCLOSTREMA HARRIETTÆ, Petterd. Journ. of Conch., 1884, p. 141.

83. Cyclostrema homalon, Verco. Trans. Roy. Soc. S. Austr., 1907, vol. xxxi., p. 305, pl. xxix., f. 3 and 4.

84. Cyclostrema pachyston, Verco. Trans. Roy. Soc. S. Austr., 1907, vol. xxxi., p. 306, pl. xxix., f. 10.

85. Cyclostrema delectabile, Tate. Trans. Roy. Soc. S. Austr., 1899, vol. xxiii., p. 216, pl. vii., f. 4.

86. Cyclostrema denselaminatum, Verco. Trans. Roy. S. Austr., 1907, vol. xxxi., p. 306, pl. xxix., f. 9.

87. Cyclostrema charopa, Tate. Trans. Roy. Soc. S. Austr., 1899, vol. xxiii., p. 217, pl. vii., f. 2a-2c. *C. micra*, Petterd.

88. Cyclostrema angeli, Ten. Woods (*Rissoia* [?]). Proc. Roy. Soc. Tasm., 1877 for 1876, p. 153.

89. Cyclostrema crebresculptum, Tate. Trans. Roy. Soc. S. Austr., 1899, vol. xxiii., p. 219, pl. vii., f. 5, probably only a variant of *C. angeli*, Ten. Woods.

90. Cyclostrema micron, Ten. Woods. Proc. Roy. Soc. Tasm., 1877 for 1876, p. 147.

91. Cyclostrema weldii, Ten.-Woods. Proc. Roy. Soc. Tasm., 1877 for 1876, p. 147. *C. susonis*, Ten. Woods; *Cirsonella australis*, Angas.

92. Cyclostrema contabulatum, Tate. Trans. Roy. Soc. S. Austr., 1899, vol. xxiii., p. 222, pl. vii., f. 6.

93. Lodderia lodderæ, Petterd (*Liotia*). Journ. of Conch. Lond., 1884, p. 135, No. 2.

94. Pseudoliotia micans, A. Adams (*Cyclostrema*). Proc. Zool. Soc. Lond., 1850, p. 43. *Liotia angasi*, Crosse; *Liotia speciosa*, Angas; *Liotia gowllandi*, Brazier; var. *gracilior*, Tate.

Family TROCHIDÆ.

95. Clanculus flagellatus, Philippi (*Trochus*). Zeits. f. Malak., 1848, p. 105. *C. floridus*, Philippi.

96. Clanculus limbatus, Quoy & Gaimard (*Trochus*). Voy. Astrolabe, 1834, vol. iii., p. 245, pl. lxiii., f. 1-6. *T. morum*, Philippi; *T. variegatus*, A. Adams.

97. Clanculus maxillatus, Menke (*Monodonta*). Moll. Nov. Holl., 1843, p. 14.

98. Clanculus yatesi, Crosse. Journ. de Conch., 1863, p. 379, pl. xiii., f. 1; *C. conspersus*, A. Adams; var. *C. subdepressa*, Crosse; var. *philippi*, Koch; var. *aloysii*, Ten. Woods, *raphaeli*, Ten. Woods; var. *philomenæ*, Ten. Woods; var. *purpuratus*, Pilsbry.

99. Clanculus ringens, Menke (*Monodonta*). Moll. Nov. Holl., 1843, p. 14.

100. Clanculus dunkeri, Koch (*Trochus* [*Monodonta*]). Abbild. Besch. Conch., 1843, vol. i., part iii., p. 67, pl. ii., f. 5. *C. rubens*, Adams & Angas.

101. Clanculus leucomphalus, Verco. Trans. Roy. Soc. S. Austr., 1905, vol. xxix., p. 168, pl. xxxi., f. 9, 10, 11.

102. Clanculus plebeius, Philippi *(Trochus)*. Conch. Cab., 1846, p. 326, pl. xlvi., f. 10. *C. nodoliratus*, A. Adams; *Gibbula multicarinata*, Ten. Woods; *C. angeli*, Ten. Woods; var. *consobrinus*, Tate.

103. Clanculus ochroleucus, Philippi *(Trochus)*. Conch. Cab., 1846, Band ii., Abt. ii., p. 243, pl. xxxvi., f. 16.

104. Clanculus euchelioides, Tate. Trans. Roy. Soc. S. Austr., 1893, vol. xvii., p. 193, pl. i., f. 8.

105. Clanculus undatus, Lamarck *(Monodonta)*. Encyc. Meth., pl. ccccxlvii., f. 3 *a*, *b*. *Trochus smithii*, Wood.

106. Monodonta (Austrocochlea) constricta, Lamarck. Anim. s. Vert., 1822, vol. vii., p. 36. *Labio porcatus*, A. Adams; *Trochocochlea multi-carinata*, Chenu; *Trochus extenuatus*, Fischer; var. *tæniata*, Quoy & Gaimard; var. *zebra*, Menke.

107. Monodonta (Austrocochlea) striolata, Quoy and Gaimard. Voy. Astrolabe, 1834, vol. iii., p. 253, pl. lxiii., f. 18-22. *Labio fuligineus*, A. Adams; *Trochus concameratus*, Wood.

108. Monodonta melanoloma, Menke. Moll. Nov. Holl., 1843, p. 14, No. 50. *Labio corrosa*, A. Adams; *Diloma hectori*, Hutton; *Trochocochlea chloropoda*, Tate.

109. Diloma odontis, Wood. Index Test. Sup., 1828, p. 17, pl. vi., f. 37.

110. Diloma adelaidæ, Philippi. Conch. Cab., 1846, p. 140, No. 168, pl. xxiv., f. 1. *Gibbula depressa*, Ten. Woods; *Diloma australis*, Ten. Woods; *Gibbula tesserula*, Ten. Woods.

111. Cantharidus lehmanni, Menke *(Trochus)*. Moll. Nov. Holl., 1843, p. 18, No. 70. *Phasianella elegans*, Lamarck (non Gmelin); *Trochus pictus*, Philippi (non Wood); *T. ramburi*, Crosse; *T. lesueuri*, Fischer.

112. Cantharidus pulcherrimus, Wood *(Trochus)*. Index Test., Sup., 1828, p. 18, pl. vi., f. 45. *Trochus preissii*, Menke; *Thalotia mariæ*, Ten. Woods.

113. Thalotia conica, Gray *(Monodonta)*. King's Austr. Survey, App., 1827, vol. ii., p. 479, No. 28. *Trochus pictus*, Wood; *Monodonta turrita*, Menke; *Thalotia dubia*, Ten. Woods.

114. Thalotia chlorostoma, Menke *(Trochus)*. Moll. Nov. Holl., 1843, p. 17, No. 68.

115. Thalotia neglecta, Tate. Trans. Roy. Soc. S. Austr., 1893, vol. xvii., part i., p. 194, pl. i., f. 6.

116. Thalotia blandiana, Crosse *(Trochus)*. Journ. de Conch. 1864, p. 339, pl. xiii., f. 1.

117. Thalotia abnormis, Crosse. Journ. de Conch., 1864, p. 341, pl. xiii., f. 2.

118. Thalotia freycineti, Fischer (*Trochus*). Journ. de Conch., 1878, p. 64.

119. Phasianotrochus carinatus, Perry (*Bulimus*). Conch., 1811, pl. xxx., f. 1; *B. eximius*, Perry; *Monodonta rosea lineata*, Lamarck; *Trochus badius*, Wood; *T. australis*, Quoy & Gaimard; *T. peronii quoyi*, Philippi; *T. lividus vermiculosus fulmineus*, Kiener.

120. Phasianotrochus bellulus, Dunker (*Trochus*). Abbild. Besch. Conch., 1845, vol. ii., part 2, pl. vii., f. 6.

121. Phasianotrochus irisodontes, Quoy & Gaimard (*Trochus*). Voy. Astrolabe, 1834, vol. iii., p. 246, pl. lxiii., f. 7-12. *Monodonta virgata*, Menke; *T. iriodon*, *T. virgulatus*, *T. minor*, *T. schrayeri*, Philippi.

122. Phasianotrochus nitidulus, Philippi (*Trochus*). Zeit. fur Malak, 1849, p. 171.

123. Phasianotrochus apicinus, Menke (*Monodonta*). Moll. Nov. Holl., 1843, p. 15, No. 58.

124. Bankivia fasciata, Menke (*Phasianella*). Syn. Meth. Moll., 1830, pp. 51, 141. *P. fulminata*, *P. undatella*, Menke; *B. varians*, Krauss; *B. purpurascens*, *B. major nitida*, A. Adams.

125. Leiopyrga picturata, H. and A. Adams. Ann. Mag. Nat. Hist., 3rd Series, 1863, vol. xi., p. 19.

126. Leiopyrga octona, Tate. Trans. Roy. Soc. S. Austr., 1891, vol. xiv., part 2, p. 260, 261, pl. xi., f. 5.

127. Gibbula tiberiana, Crosse (*Trochus*). Journ. de Conch., 1863, p. 381, pl. xiii., f. 2. *Cantharidus decoratus*, Adams & Angas; *Gibbula aurea*, Ten. Woods; *Thalotia tesselata*, Ten. Woods; *G. smaltata*, Fischer.

128. Gibbula reedi, Verco. Trans. Roy. Soc. S. Austr., 1907, vol. xxxi., p. 307, pl. xxix., f. 5.

129. Gibbula coxi, Angas. Proc. Zool. Soc. Lond., 1867, p. 115, pl. xiii., f. 26.

130. Gibbula lehmanni, Menke (*Turbo*). Moll. Nov. Holl. 1843, p. 13, No. 48.

131. Gibbula tasmanica, Petterd. Quarterly Journ. of Conch., Leeds, 1877, vol. ii., p. 103.

132. Minolia preissiana, Philippi (*Trochus*). Zeits. fur Malak., 1848, p. 123. *Gibbula porcellana*, A. Adams; *G. weldii*, Ten. Woods.

133. Minolia vitiliginea, Menke (*Trochus*). Moll. Nov. Holl., 1843, p. 18, No. 73. *Margarita tasmanica*, Ten. Woods.

134. Minolia philippensis, *Watson* (*Trochus* [*Solariella*]). Journ. Lin. Soc. Lond., 1881, vol. xv., p. 92.

135. Calliostoma meyeri, Philippi *(Trochus)*. Zeits fur Malak, 1848, p. 101. *T. levis*, Hombron and J; *Zizyphinus armillatus*, Reeve; *Z. euglyptus*, Adams.

136. Calliostoma nobile, Philippi *(Trochus)*. Conch. Cab., 1846, Bd. ii., Abt. ii., iii., p. 86, pl. xv., f. 6, and pl. xxxviii., f. 1; *T. rubiginosus*, Valenciennes; *Z. splendidus*, Philippi.

137. Calliostoma australis, Broderip *(Trochus)*. Zool. Journ., 1830, vol. v., p. 331, tab. suppl. 49, f. 3.

138. Calliostoma ciliare, Menke *(Trochus)*. Moll. Nov. Holl., 1843, p. 17, No. 66.

139. Calliostoma rubropunctatum, A. Adams *(Zizyphinus)*. Proc. Zool. Soc. Lond., 1851, p. 167. *C. spinulosum*, Tate.

140. Calliostoma hedleyi, Pritchard & Gatliff. Proc. Roy. Soc. Vict., 1902, vol. xiv. (n.s.), part 2, p. 182, pl. ix., f. 4.

141. Calliostoma legrandi, Ten. Woods *(Zizyphinus)*. Proc. Roy. Soc. Tasm., 1876 for 1875, p. 154.

142. Calliostoma poupineli, Montrouzier, *(Trochus [Zizyphinus])*. Journ. de Conch., 1875, p. 40, pl. iv., f. 6. *Z. comptus*, A. Adams; *C. purpureo-cinctum*, Hedley.

143. Calliostoma allporti, Ten. Woods *(Trochus [Zizyphinus])*. Proc. Roy. Soc. Tasm., 1876 for 1875, p. 155.

144. Calliostoma zietzi, Verco. Trans. Roy. Soc. S. Austr., 1905, vol. xxix., p. 166, pl. xxxi., f. 1, 2, 3.

145. Calliostoma incertum, Reeve *(Zizyphinus)*. Conch. Icon., 1863, vol. xiv., pl. v., f. 28.

146. Astele subcarinatum, Swainson. Proc. Roy. Soc. Van Diemen's Land, 1854, vol. iii., p. 36, pl. vi., f. 1-2. *Eutrochus perspectivus*, A. Adams; *Calliostoma adamsi*, Pilsbry; *Zizyphinus subgranularis*, Dunker.

147. Astele multigranum, Dunker *(Zizyphinus)*. Mal. Blätt, 1871, vol. xviii., p. 169.

148. Astele calliston, Verco. Trans. Roy Soc. S. Austr., 1905, vol. xxix., p. 167, pl. xxxi., f. 7, 8.

149. Minos petterdi, Crosse *(Fossarina)*. Journ. de Conch., 1870, p. 303, 1871, pl. xii., f. 1. *Fossarina simsoni*, Ten. Woods.

150. Euchelus baccatus, Menke *(Monodonta)*. Moll. Nov. Holl., 1843, p. 14, No. 51. *Trochus aspersus*, Koch.

151. Euchelus scabriusculus, Angas. Proc. Zool. Soc., Lond., 1867, p. 215, No. 181. *E. tasmanicus*, Ten. Woods.

152. *Euchelus vixumbilicatus*, Tate. Trans. Roy. Soc. S. Austr., 1893, vol. xvii., part 1, p. 196, pl. i., f. 4.

153. Euchelus fenestratus, Tate. Trans. Roy. Soc. S. Austr., 1893, vol. xvii., part 1, p. 195, pl. 1, f. 2.

154. Euchelus pumilio, Tate. Trans. Roy. Soc. S. Austr., 1893, vol. xvii., part 1, p. 196, pl. i., f. 3.

155. Euchelus ampullus, Tate, Trans. Roy. Soc. S. Austr., 1893, vol. xvii., part 1, p. 197, pl. i., f. 5.

156. Basilissa radialis, Tate (*Seguenzia*). Trans. Roy. Soc. S. Austr., 1890, vol. xiii., p. 192, pl. ix., f. 6; var. *bilix*, Hedley (*Astele*), Records Austr. Mus., 1905, vol. vi., part 2, p. 48, f. 13.

Family UMBONIIDÆ.

157. Teinostoma cancellata, Tate (*Ethalia?*). Trans. Roy. Soc. S. Austr., 1878-9, p. 139, pl. v., f. 11 *a* to *c*.

158. Teinostoma lucida, Adams & Angas (*Neritula*). Proc. Zool. Soc. Lond., 1863, p. 35.

159. Adeorbis vincentiana, Angas. Proc. Zool. Soc. Lond., 1880, p. 417, pl. xl., f. 9.

160. Adeorbis kimberi, Verco. Trans. Roy. Soc. S. Austr., 1907, vol. xxxi., p. 308, pl. xxix., f. 1 and 2.

Family NERITIDÆ.

161. Nerita melanotragus, E. A. Smith. "Alert" collection, Zool., 1884, p. 69, No. 82. *N. nigra*, Gray (non Chemn.); *N. atrata*, Reeve (non Chemn.); *N. saturata*, Hutton.

MICROSCOPICAL SECTION

OF THE

Royal Society of South Australia (Incorporated).

ANNUAL REPORT, 1906-7.

Officers.—Chairman, Mr. W. Fuller; Vice-Chairman, Mr. W. B. Poole; Committee, Messrs. D. Gordon and D. Mawson, B.E., B.Sc.; Minute Secretary, Mr. H. A. Whitehill; Hon. Secretary, Mr. E. J. Bradley, Dover Street, Malvern; Auditors, Messrs. S. Smeaton, B.A., and T. Godlee.

In submitting the report for the year 1906-7 the Committee is pleased to state that the Section has entered the new quarters provided for the Royal Society and its Sections. During the past session the average attendance of members at meetings and excursions has been maintained to the standard of previous sessions, whilst the roll of members shows that steady progress is being made, despite the fact of the usual loss through death and resignations. The Committee deplores the death of Mr. David Fleming, a foundation member and past Chairman, who was holding office as Vice-Chairman at the time of his demise, and also the death of Miss Heyneman, a foundation member.

The position of the Section generally is now more favourable to progress than at any time in its previous history, and a more active interest is manifested by members, who, on the whole, are displaying a greater tendency to take up special lines of original research.

The constitution of the Section has been slightly remodelled, and the regulations regarding the number of officers and admission of honorary corresponding members have been amended.

The following meetings and excursions have been held during the session:—

September 23, 1906.—Annual general meeting, at which an address was delivered by the Chairman, Mr. W. Fuller, on "The Miscroscope in Science and Commerce."

October 23.—Paper on "The Construction, Stocking, and Maintenance of the Fresh-water Aquarium," by Mr. S. Smeaton, B.A.

November 27.—Mr. G. Quinn read a paper on "Some Parasitic Fungi found in our Gardens, and Methods of Prevention," illustrated by diagrams and specimens.

March 23, 1907.—Dredging excursion, Port River.

March 26.—Exhibition of work done by members during the summer recess.

April 20.—Excursion to Patawalonga River, *via* Fulham.

April 23.—Paper by Mr. W. B. Poole on "Diatoms," with diagrams and various specimens of many species, etc.

May 28.—Exhibition of specimens of microphotography by Mr. W. B. Poole, Hydrozoa by Mr. Bradley, and Rotifera by Mr. Showell.

June 12.—Conversazione in connection with the opening of the new rooms.

June 25.—Exhibition and descriptive account by Dr. E. Angas Johnson of a number of Bacteria and Parasites affecting man and beasts, and also exhibition of cancer of mouse obtained by artificial inoculation.

July 23.—Conversation meeting and exhibition of Microphotographs by Mr. Dollman.

August 24.—Excursion to Blackwood.

August 27.—Paper on "Desmids" by Mr. E. J. Bradley, illustrated by blackboard sketches and living specimens.

September 24.—Excursion to Happy Valley.

Edgar J. Bradley, Hon. Secretary.

MICROSCOPICAL SECTION

OF THE

ROYAL SOCIETY OF SOUTH AUSTRALIA.

Balance-sheet, Session 1906-7.

Receipts.

	£	s.	d.
Subscriptions, 1906-7	8	17	6
Balance in hand beginning of Session ...	1	3	8
Grant from Royal Society	9	0	0
	£19	1	2

Expenditure.

	£	s.	d.
Subscriptions, 1906-7, paid to Treasurer of Royal Society	8	17	6
Postage and Duty Stamps	2	0	8
Stationery and Printing	2	14	0
Attendance	1	10	0
Balance in hand	3	19	0
	£19	1	2

Edgar J. Bradley, Hon. Secretary.

Audited and found correct.

S. Smeaton, } Auditors
Theo. Godlee, }

September 17, 1907.

GENERAL INDEX.

[Generic and specific names printed in italics indicate that the forms described are new.]

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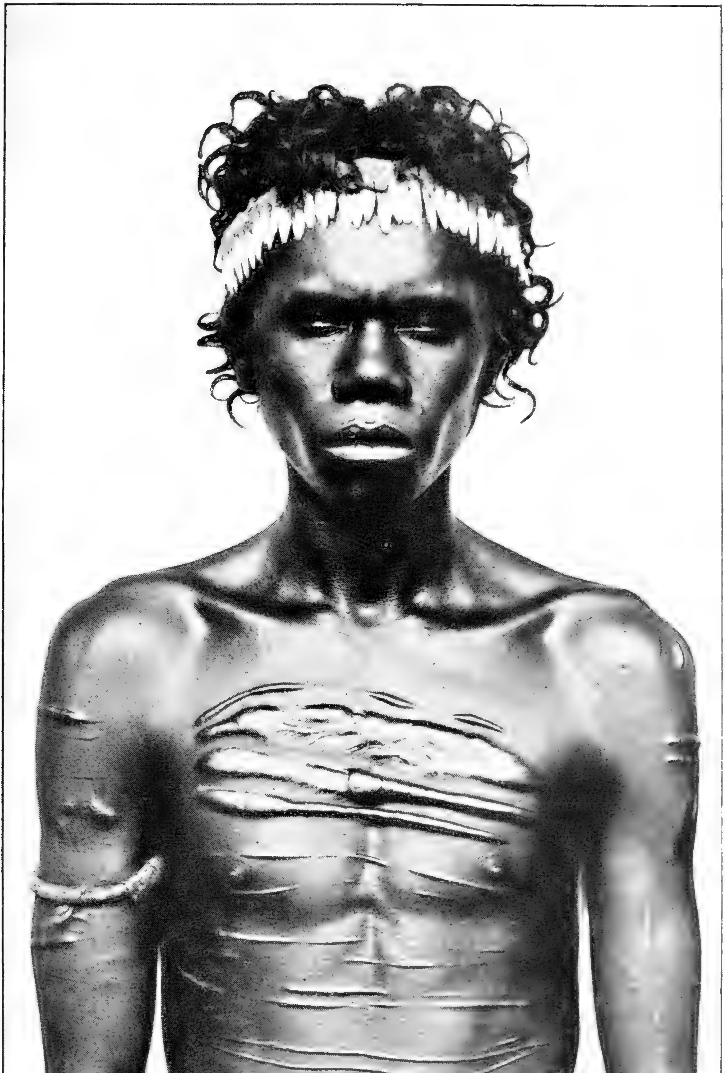
PLATES I. TO XXIX.



LARREKIYA YOUTH

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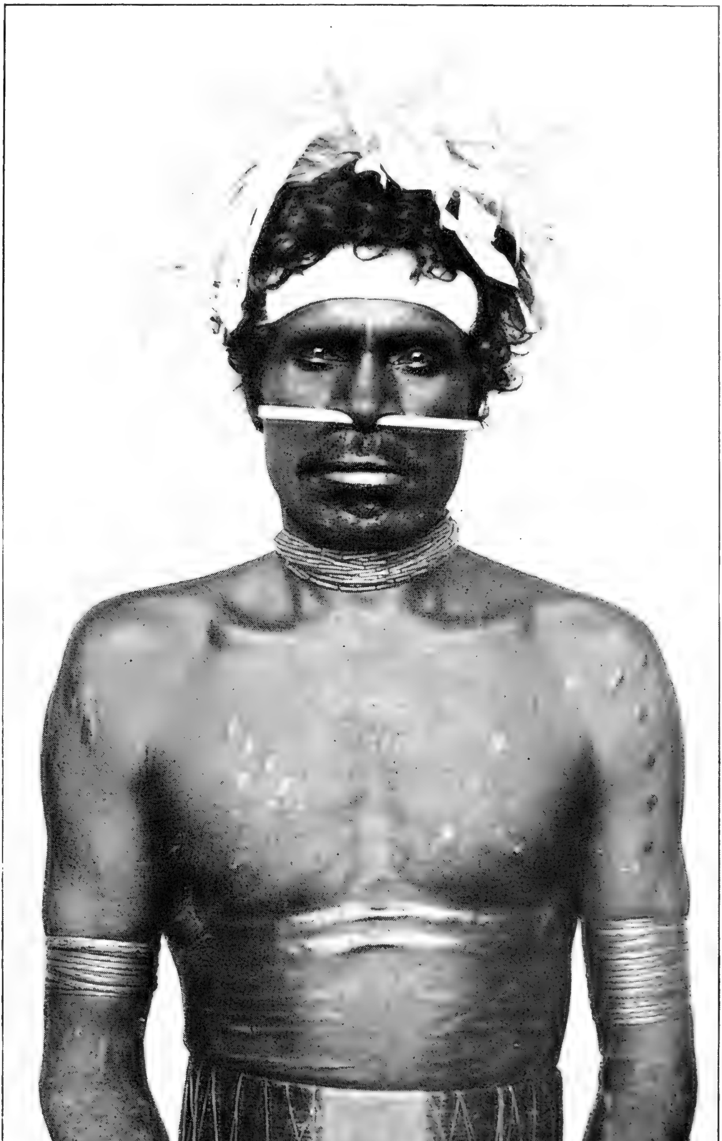

LARREKIYA MAN.

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LARREKIYA WIDOW.

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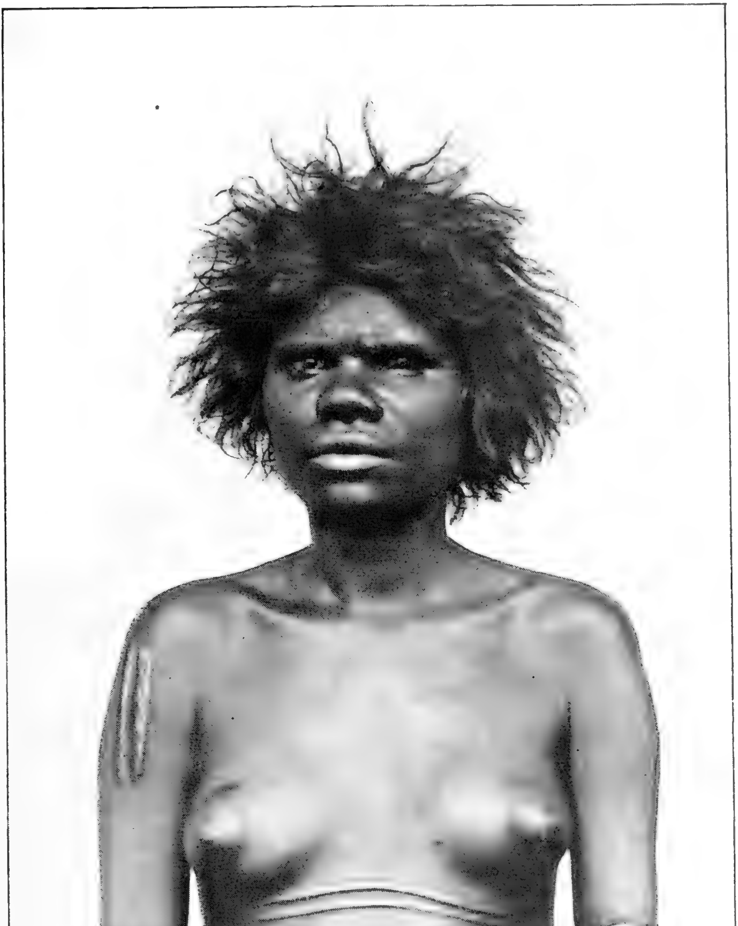
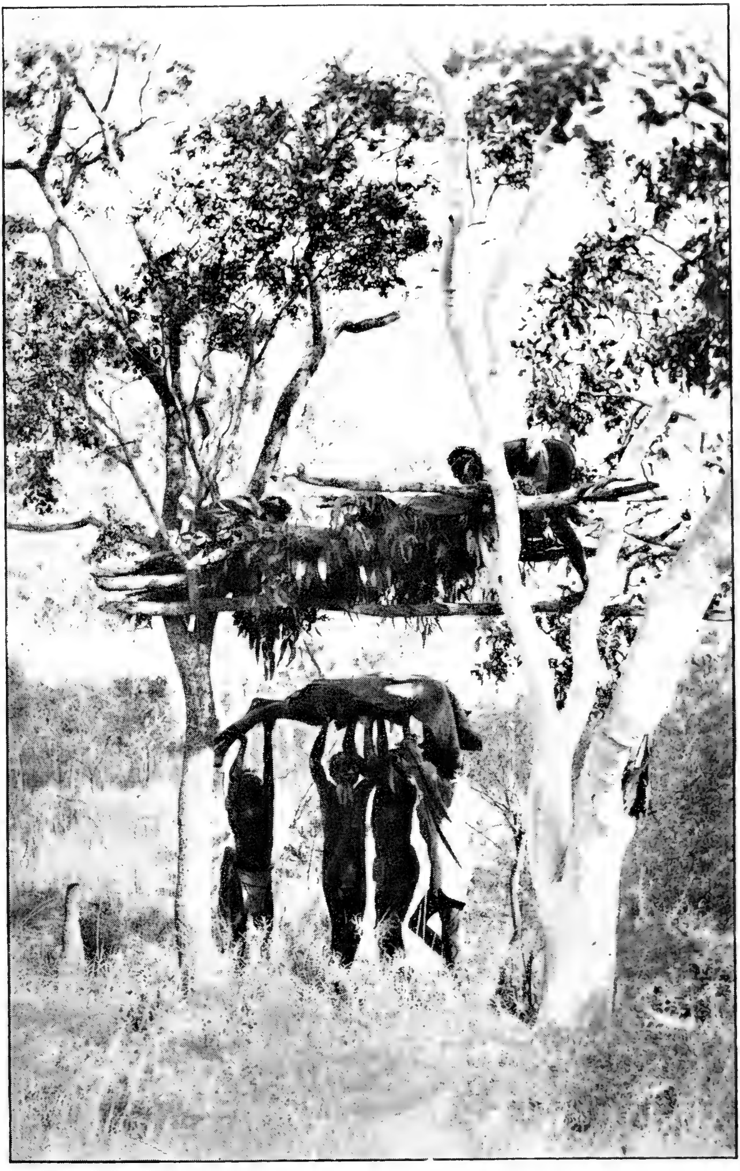


KUNANDRA WOMAN.

Hussey & Gillingham, Printers, Adelaide.



TREE-BURIAL

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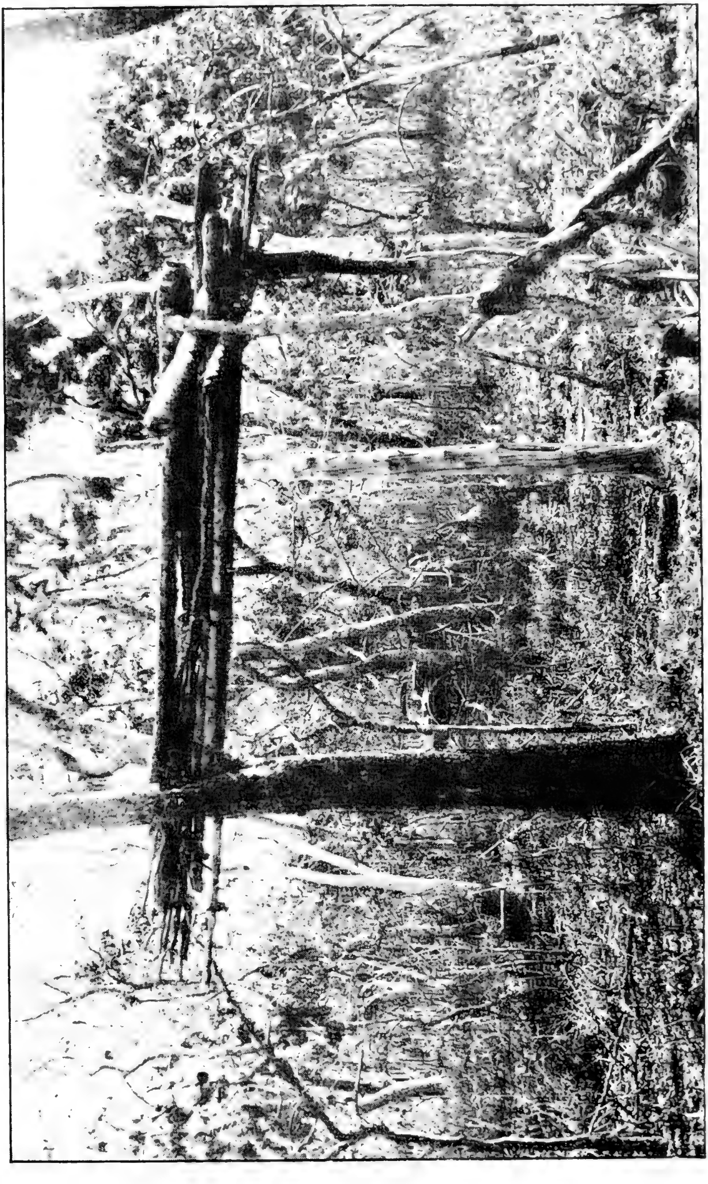

BURIAL-PLATFORM, NEAR KNUCKEY'S LAGOON.

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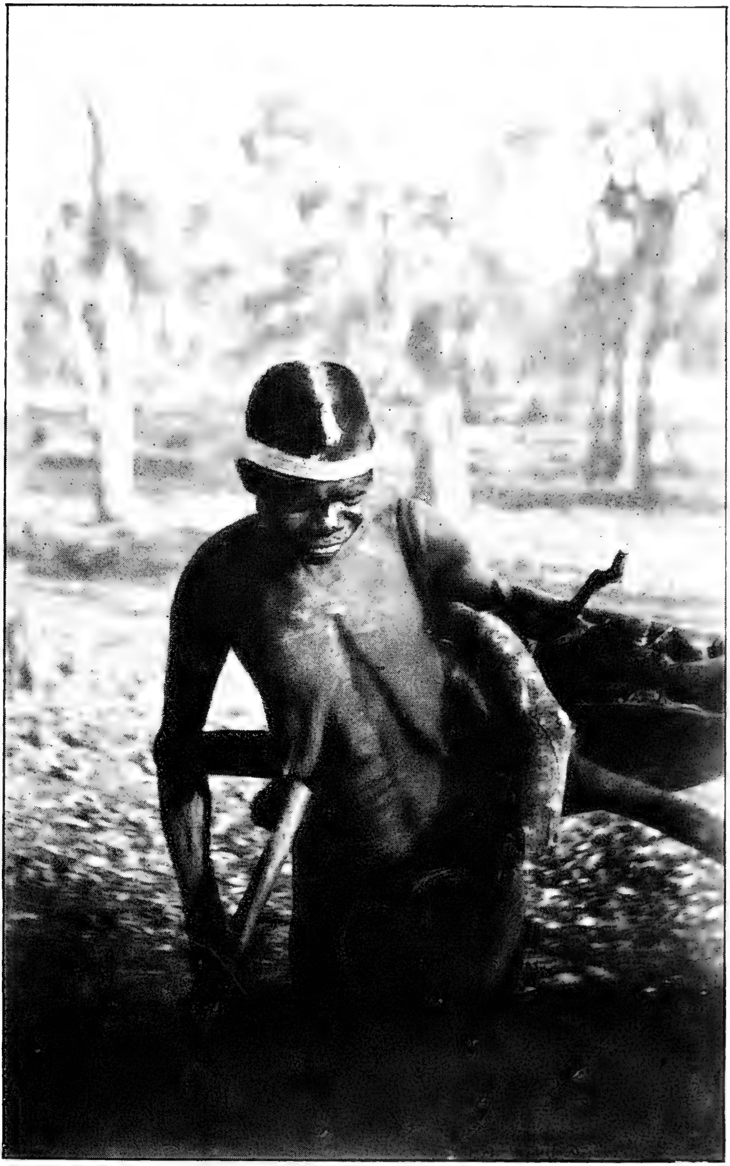

WOMAN IN MOURNING.

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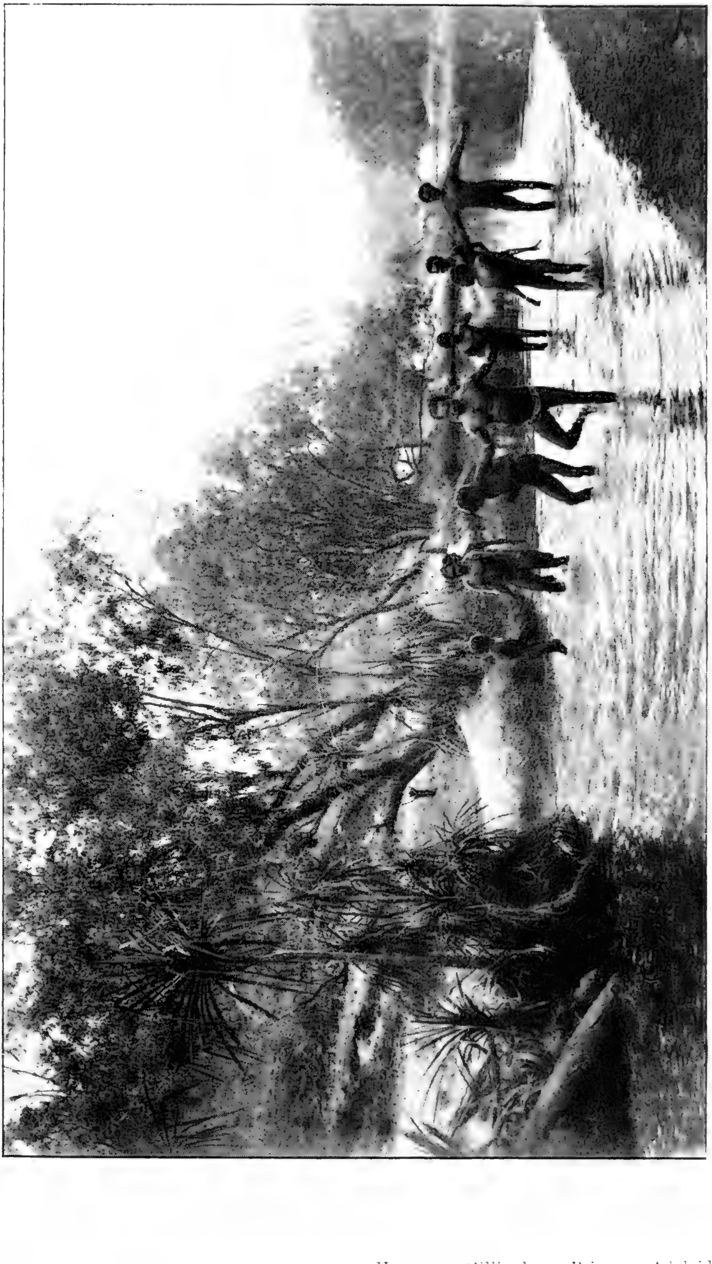

DRIVING FISH TO TRAP, KATHERINE RIVER.

Hussey & Gillingham, Printers, Adelaide.

NATIVE HUT.

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FIG. 1.
IMPLEMENTS FOR MAKING FIRE BY "SAWING PROCESS."

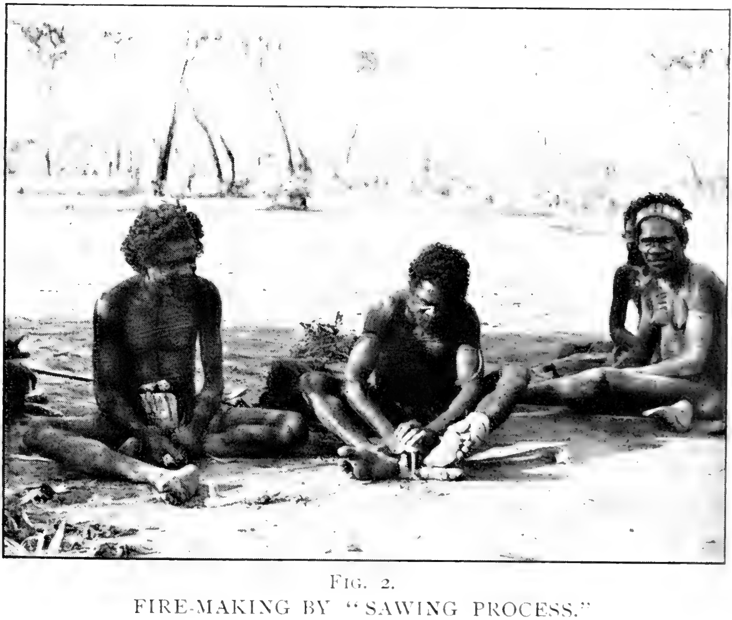

FIG. 2.
FIRE-MAKING BY "SAWING PROCESS."

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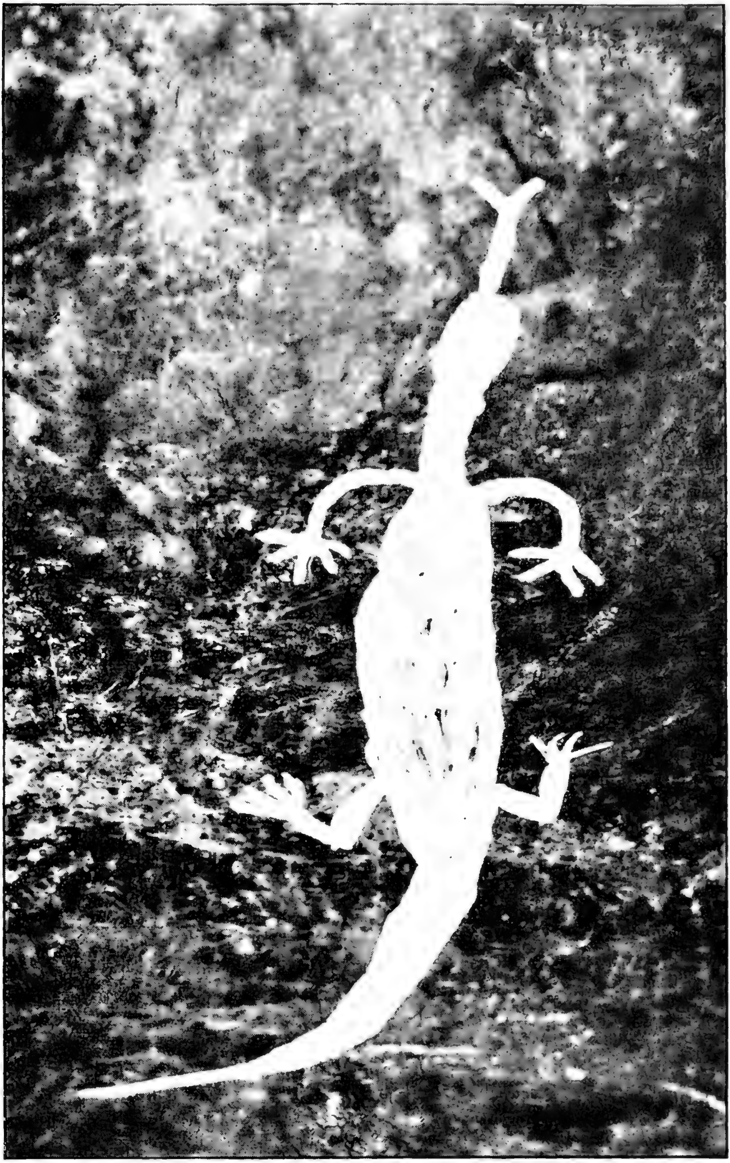
ROCK DRAWINGS, BLUNDER BAY, VICTORIA RIVER.

ROCK DRAWINGS, BLUNDER BAY, VICTORIA RIVER.



ROCK-DRAWING, KATHERINE RIVER (MONITOR).

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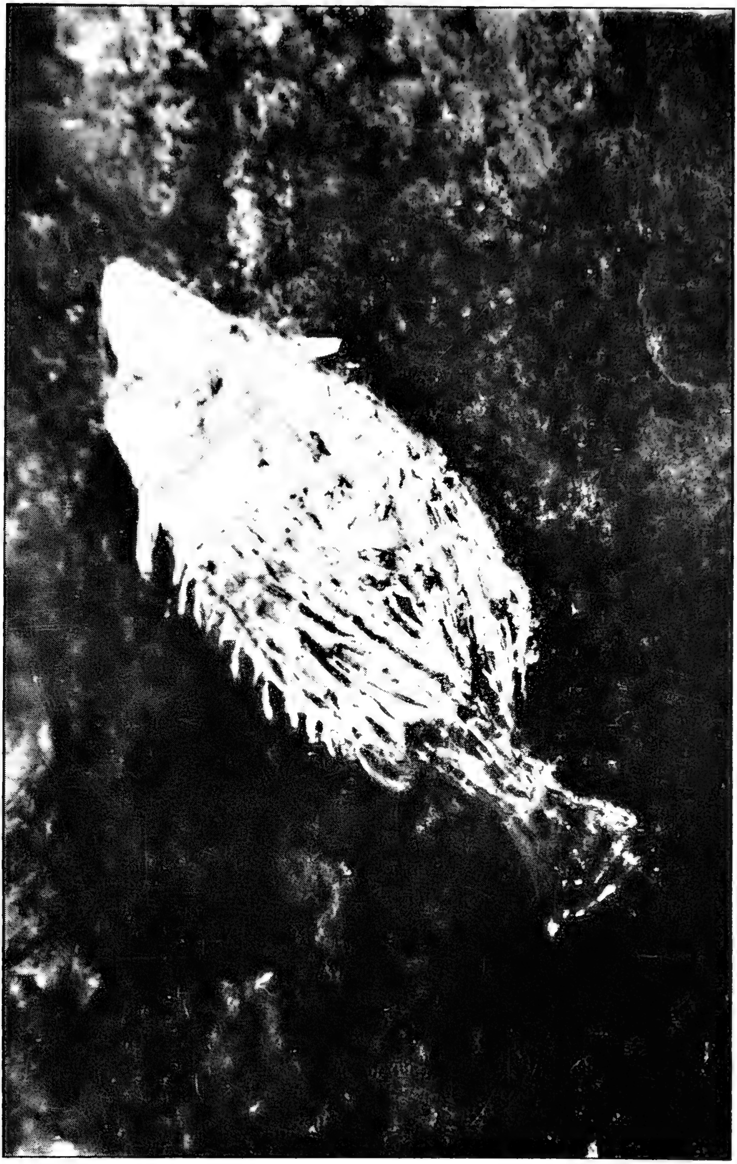
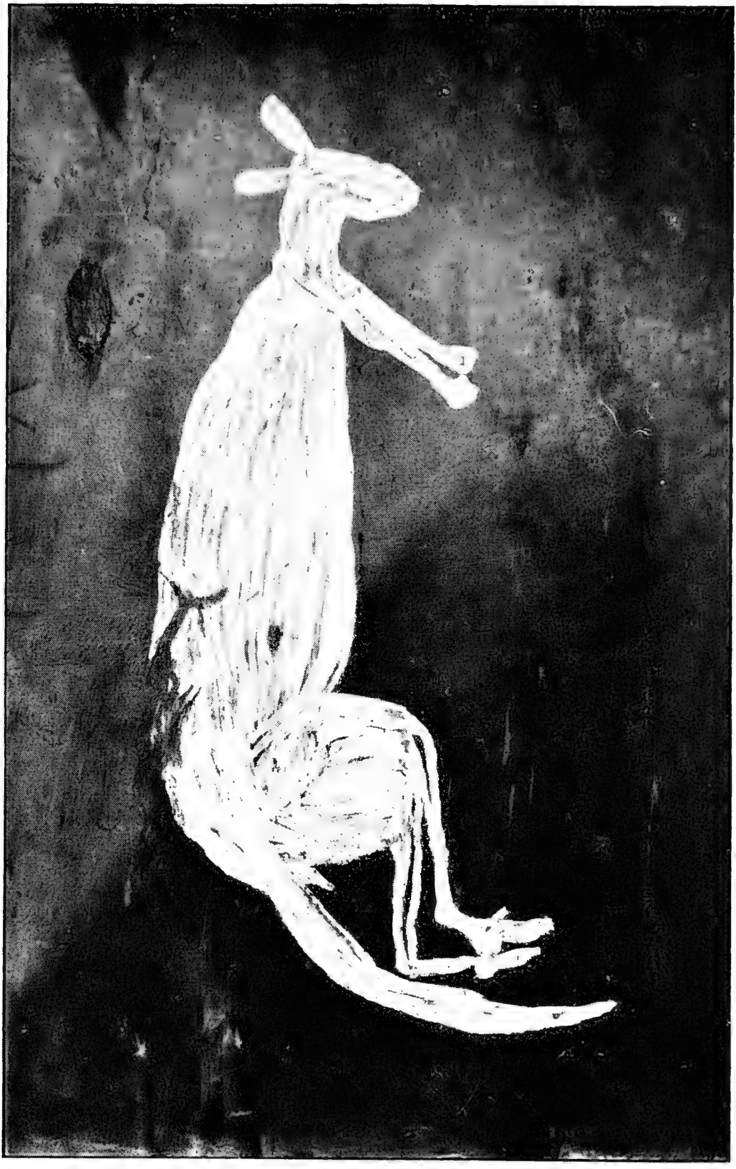
ROCK DRAWING, KATHERINE RIVER, [illegible]

[illegible]



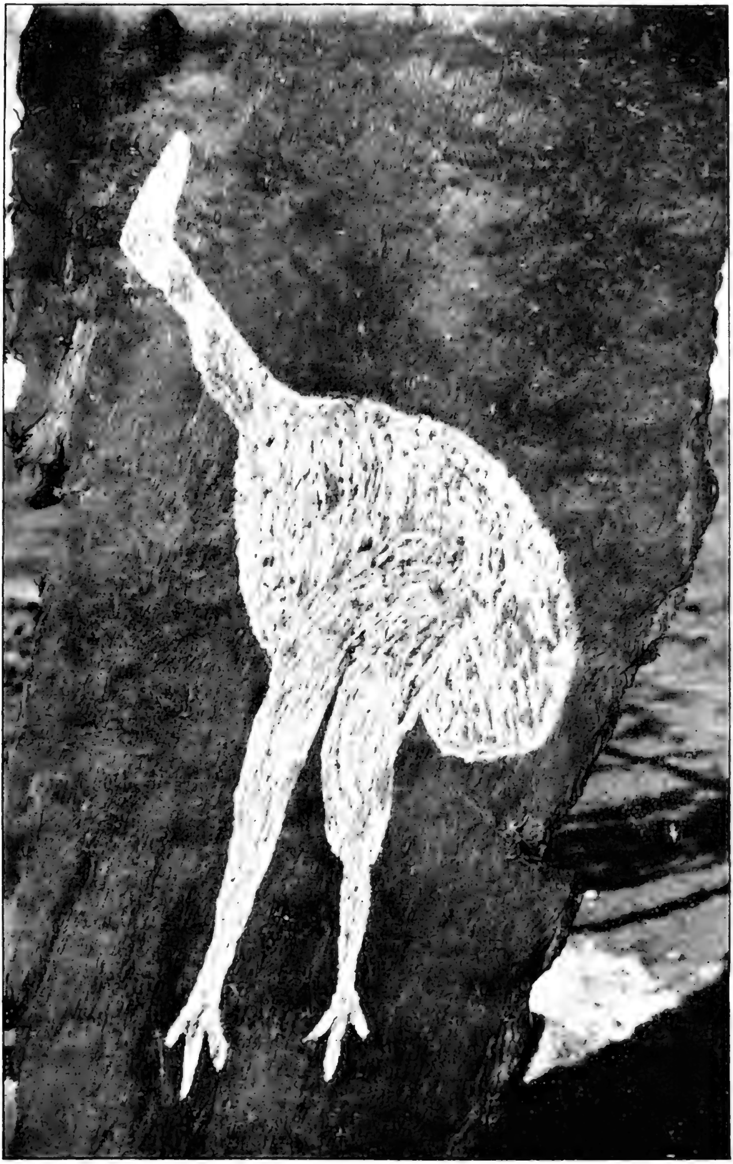
ROCK-DRAWING, KATHERINE RIVER (*THERAPON* Sp.).

Hussey & Gillingham, Printers, Adelaide.



BARK-DRAWING, KATHERINE RIVER (KANGAROO).

Hussey & Gillingham, Printers, Adelaide.



BARK-DRAWING, KATHERINE RIVER (EMU).

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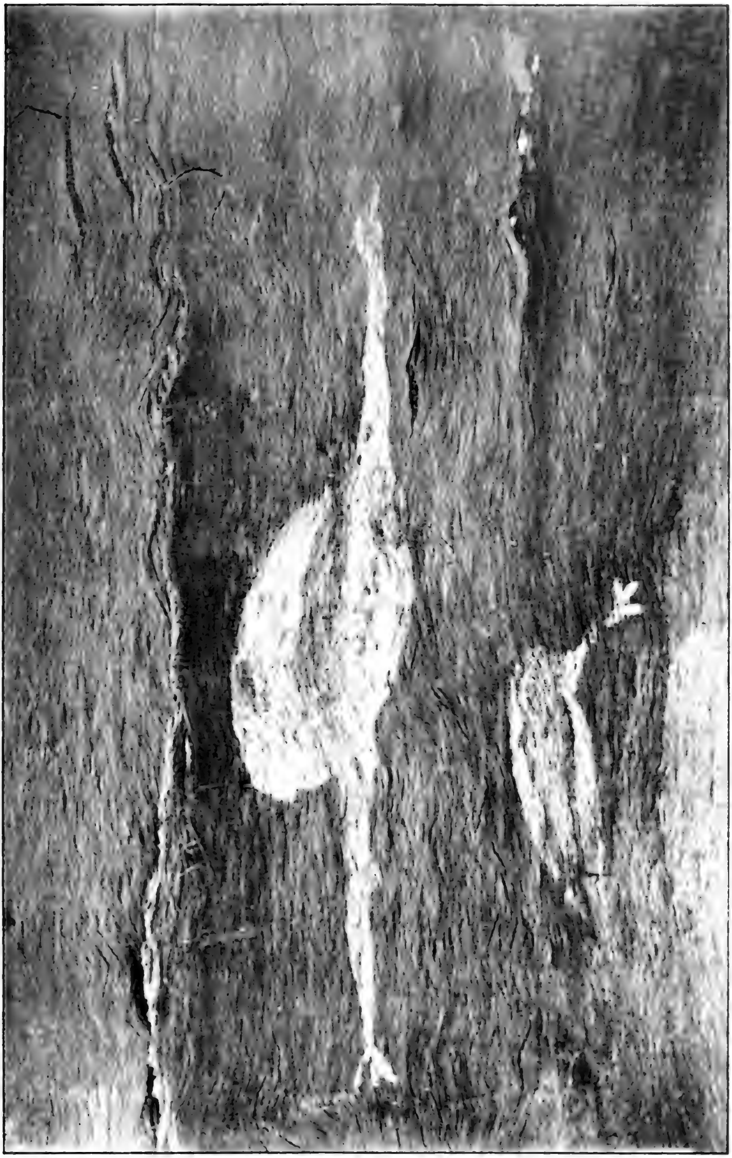

BARK-DRAWING, KATHERINE RIVER (BUSTARD).

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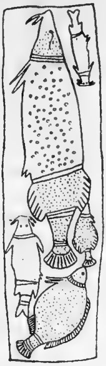
2



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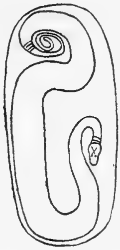

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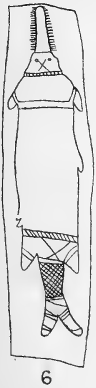

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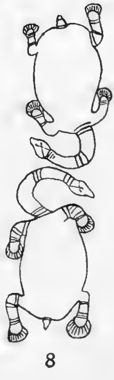

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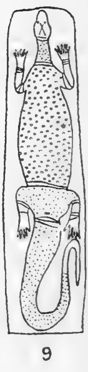

9

DRAWINGS ON BARK FROM EAST OF PORT DARWIN.

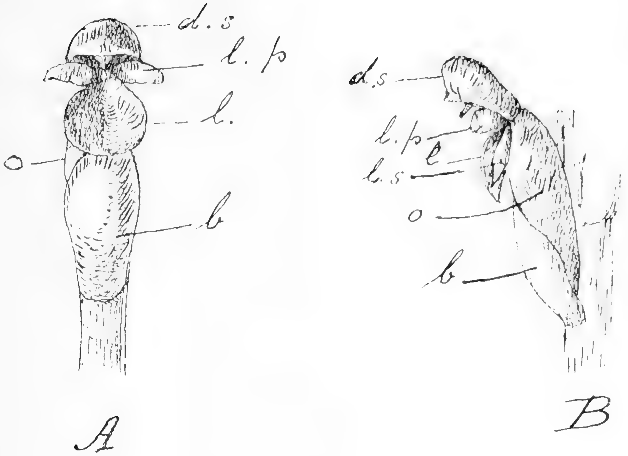

Fig. 1.

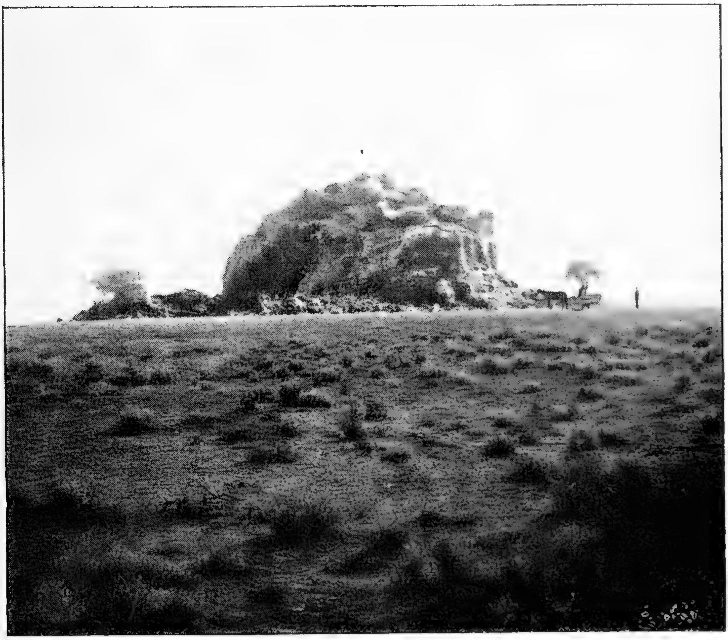

Fig. 2.

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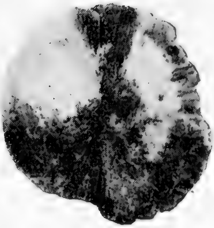

Fig. 1.

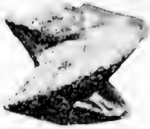

Fig. 2.

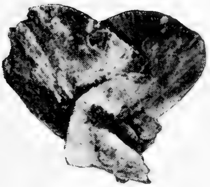

Fig. 1a.

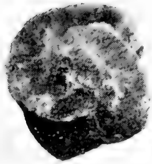

Fig. 2a.

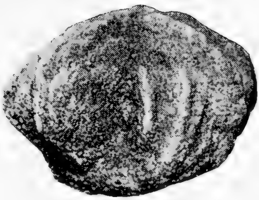

Fig. 3.

Fig. 4.

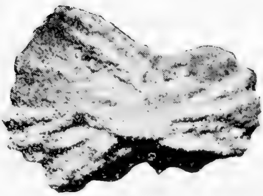

Fig. 3a.

Fig. 4a.

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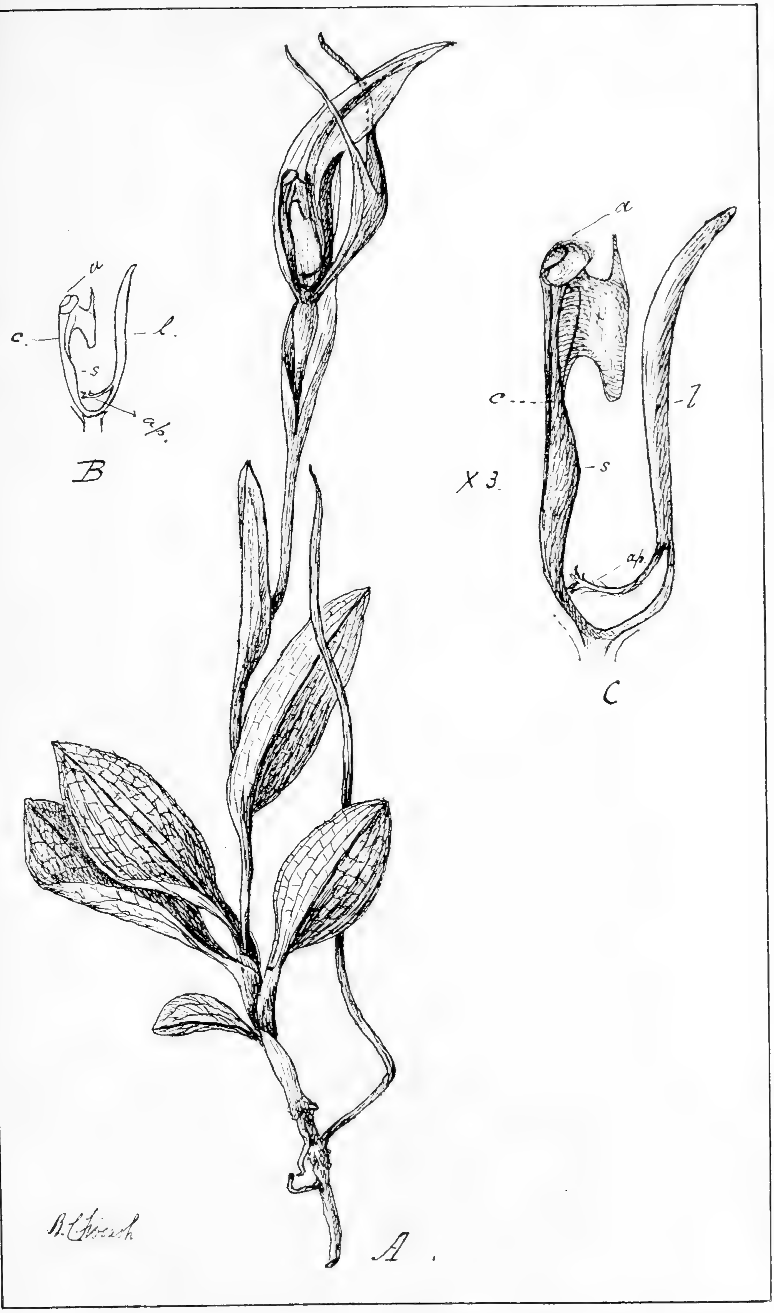
Figs. 1 and 2.—Twinned Gypsum Crystals from Patawalonga Creek; two-thirds natural size.

Figs. 3 and 4.—Barytes Sand Crystals from Hallett Cove; natural size.



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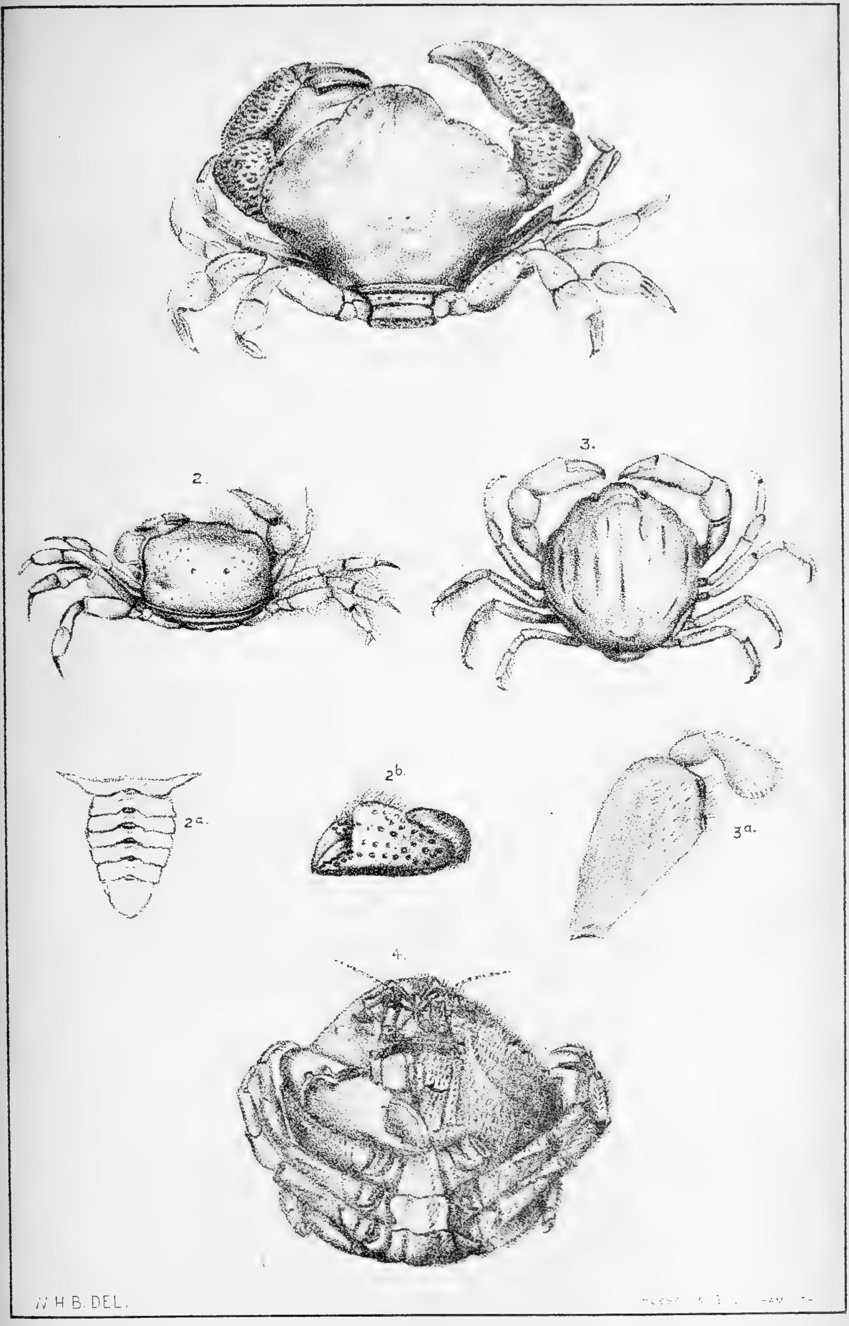
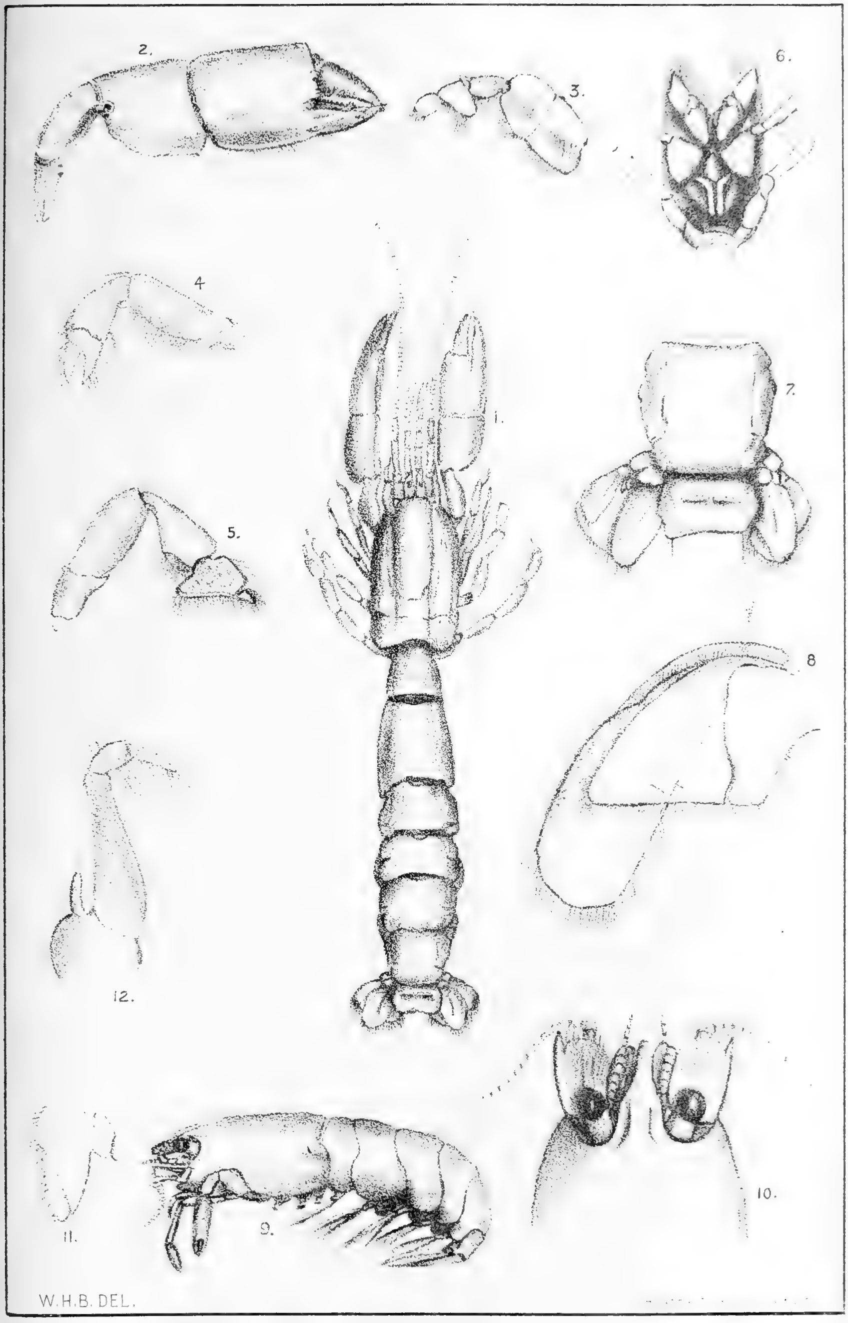

2.
3.
2a.
2b.
3a.
4.
W H B. DEL.


2.
3.
6.
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1.
7.
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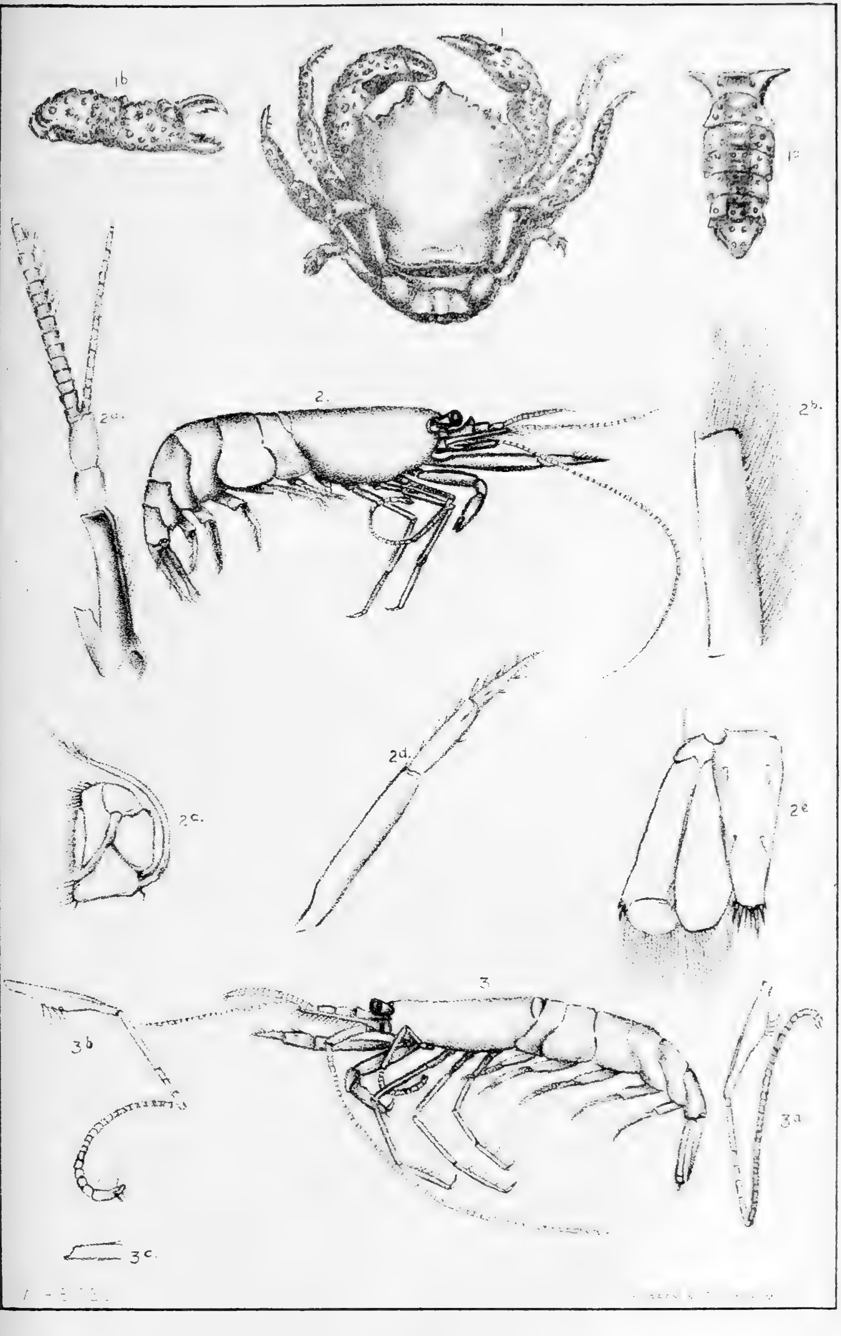
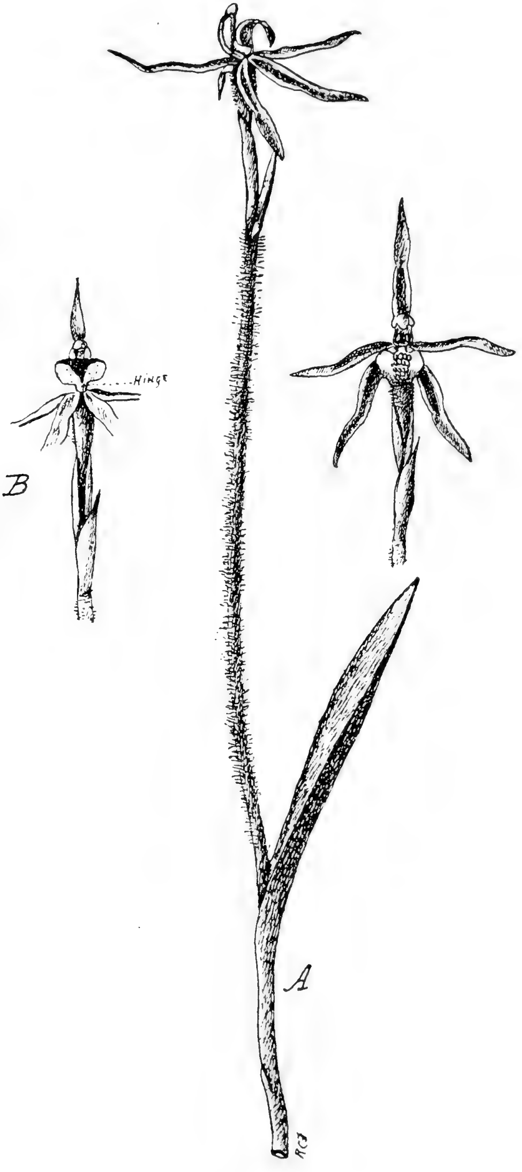
12.
10.
11.
9.
W.H.B. DEL.



1
1b
1c
2.
2a.
2b.
2c.
2d.
2e
3
3a
3b
3c.



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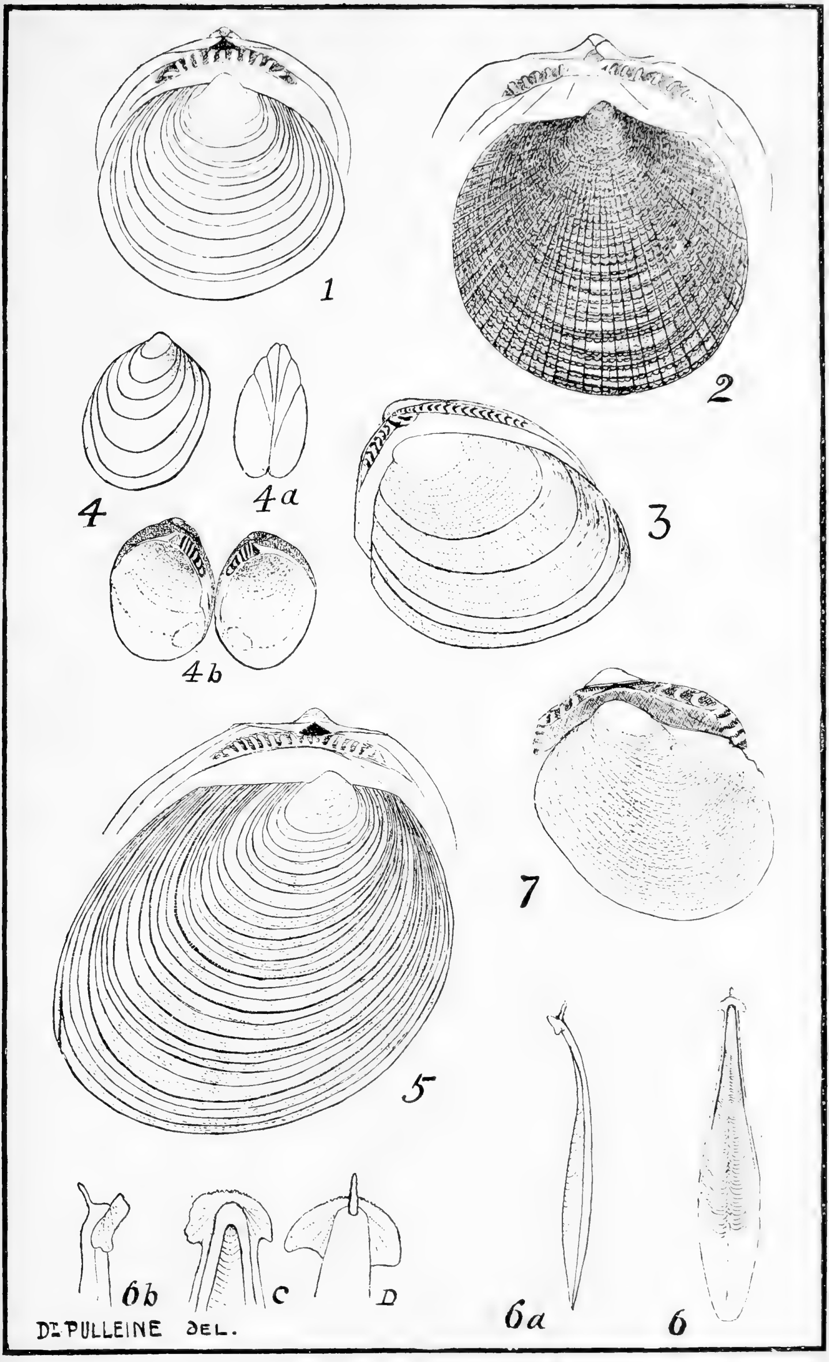

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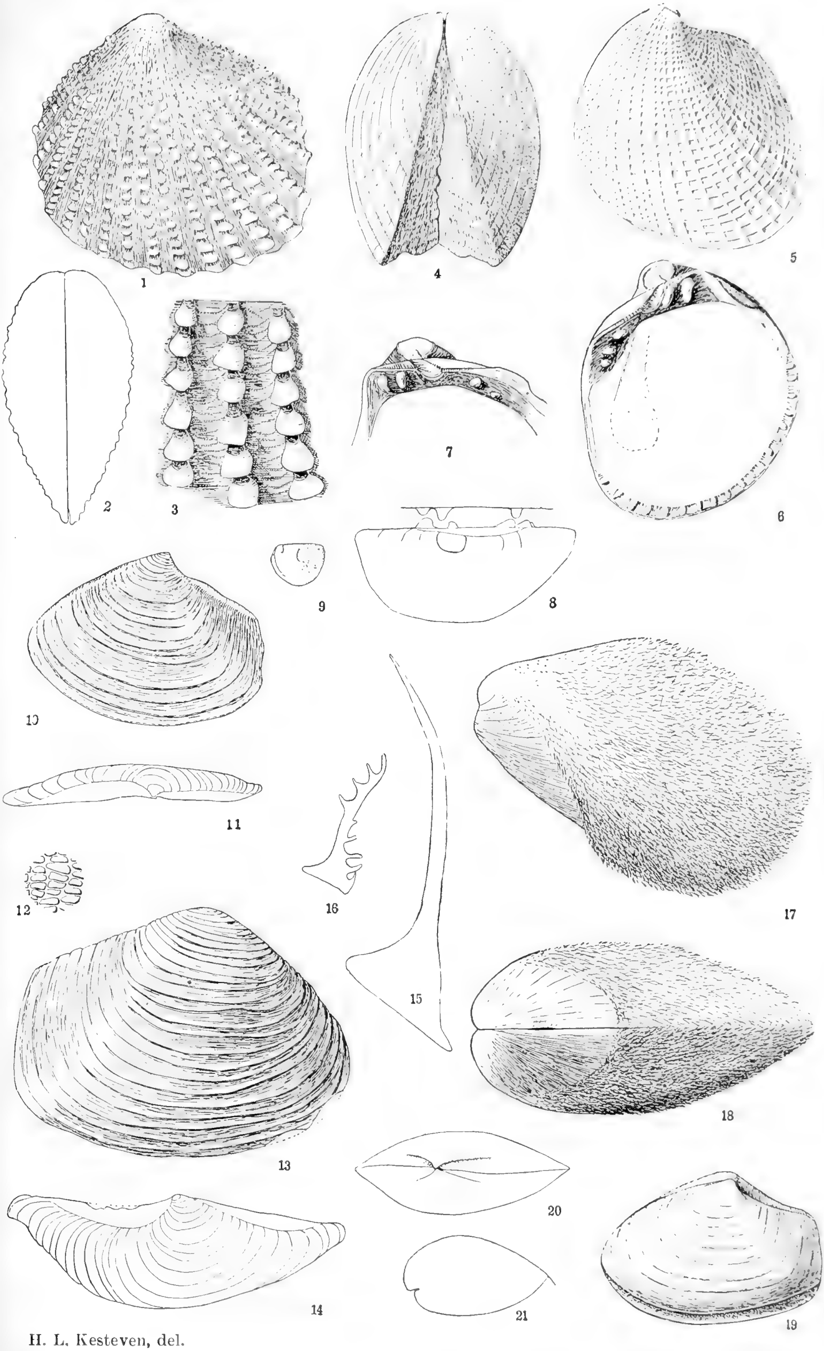

H. L. Kesteven, del.

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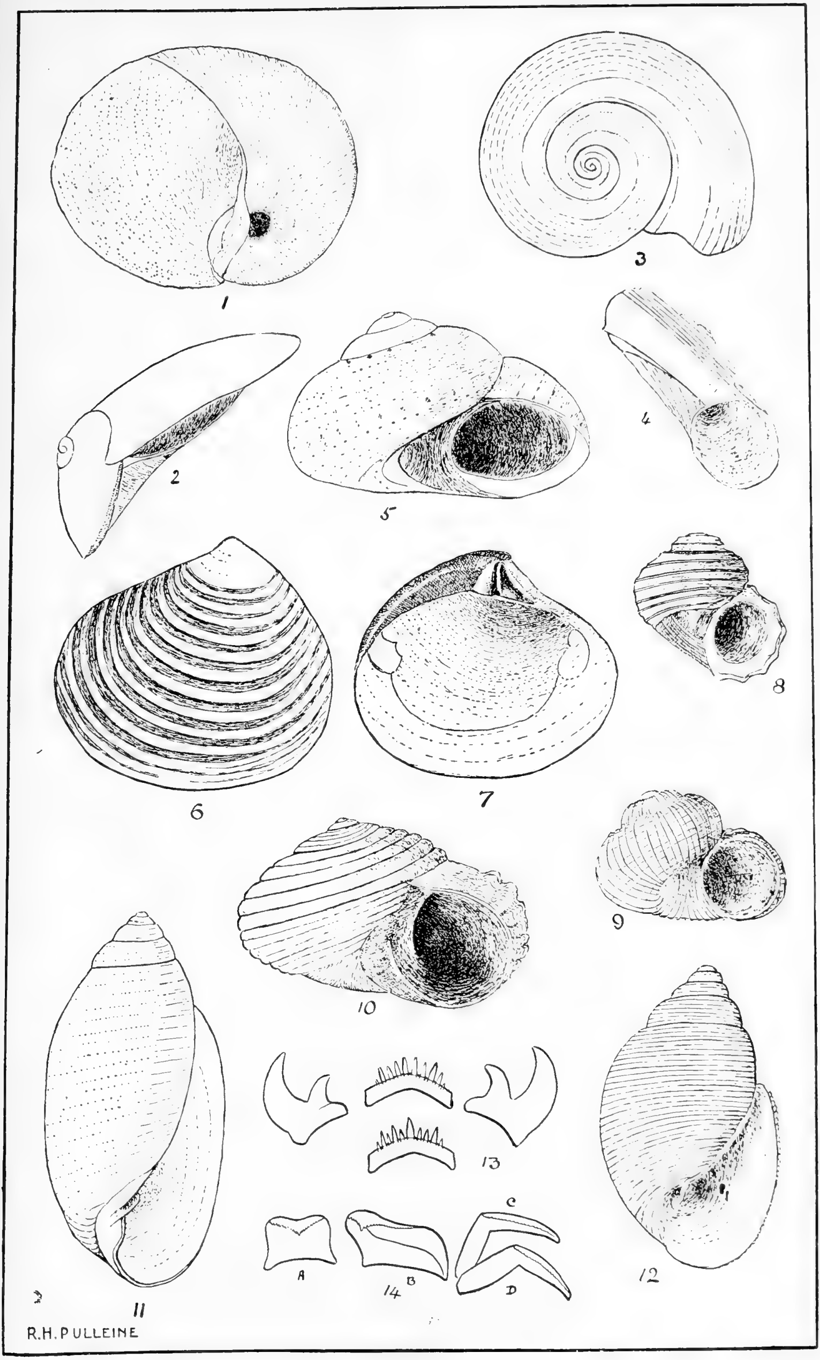

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APPENDICES.